NON-RESPONSE BIAS ON WEB-BASED SURVEYS AS INFLUENCED BY THE DIGITAL DIVIDE AND PARTICIPATION GAP

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Kevin R. Guidry

NON-RESPONSE BIAS ON WEB-BASED SURVEYS AS INFLUENCED BY THE DIGITAL DIVIDE AND PARTICIPATION GAP

Higher education scholars, policy makers, and administrators know little about the experiences of undergraduate students who matriculate with minimal experience with technology. It is often assumed that all students, particularly traditionally-aged students, have significant experience with, knowledge of, and comfort with technology. Although that assumption is correct for many students, it is false for others. Despite the enormous increase in the use of Web-based assessment surveys and the increasing importance of accurate assessment and accountability data, those efforts may not be collecting adequate and accurate data about and from all students.

This study explores the non-response bias of first-year undergraduate students on a self-administered Web-based survey. First, data were collected with a supplemental survey added to the Beginning College Survey of Student Engagement (BCSSE). K-means clustering was used with this newly constructed Internet Access and Use survey to classify students according to their Internet access and use experiences. Second, demographic data from BCSSE and the Internet access and use data were included in a logistic regression predicting response to the subsequent National Survey of Student Engagement (NSSE).

The Internet Access and Use instrument proved to be a viable way to classify students along lines of their previous Internet access and use experiences. However, that classification played no meaningful role predicting whether students had completed NSSE. Indeed, despite its statistical significance the final logistic regression model using provided little meaningful predictive power.

Generalizing the results of this study to all Web-based surveys of undergraduate college students with random or census sampling indicates that those surveys may not introduce

significant non-response bias for students who have had less access to the Internet. This is particularly important since that population is already vulnerable in many ways as being disproportionately composed of first-generation students, underrepresented minority students, and students with lower socioeconomic statuses. This reassures assessment professionals and all higher education stakeholders that cost- and labor-efficient Web-based surveys are capable of collecting data that do not omit the voices of these students.

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Chapter One: Introduction

There is an immense demand for accurate, timely information about students at U.S. colleges and universities. Elected officials, policy makers, and the general public have made clear demands for accountability. Accreditors and institutional consortia are pressing their members to collect and share accurate and useful data, partly in reaction to governmental demands and partly to forestall additional, more onerous demands. Within institutions, faculty and administrators are increasingly gathering and using data – demographic, behavioral, and academic – to monitor, model, and intervene with students and programs.

Higher education scholar Peter Ewell has traced the beginnings of today's learning outcomes assessment movement to the 1980s (Ewell, 2009). The growing demands by state legislatures that colleges and universities prove their good stewardship of taxpayer money gained an immense boost in 2006 when then-Secretary of Education Margaret Spellings convened a commission to examine the future of U.S. higher education, a commission that called for further accountability from colleges and universities (The Secretary of Education's Commission on the Future of Higher Education, 2006). To the consternation of some higher education administrators and faculty members, those demands have not died down. In fact, the declining economic climate of the last decade seems to have increased demands for accountability. For example, immense pressure has been brought to bear on the growing for-profit higher education industry to meet benchmarks of accountability, particularly ones tied to information about student debt and employment (Fain, 2012).

Accreditors and institutional consortia have reacted to these demands for accountability. Accreditors have significant leverage with institutions and they are slowly changing their

practices to demand that member institutions collect accurate learning assessment data and use it to effect change (Provezis, 2010). For example, in 2001 the Southern Association of Colleges and Schools began requiring institutions seeking reaccreditation to create a Quality Enhancement Plan that requires institutions to "present a well-constructed plan that identifies strategies to produce *measurable* [emphasis added] improvement(s) in student learning" (Jackson, Davis, & Jackson, 2010). At the same time, institutional consortia such as the Association of Public and Land-Grant Universities (APLU) and the American Association of State Colleges and Universities (AASCU) have made their own attempts to collect and publicly display data. The Voluntary System of Accountability developed by APLU encourages institutions to voluntarily collect and display information in three broad areas: consumer information, student experiences and perceptions, and student learning outcomes (Voluntary System of Accountability, 2008).

Related to but separate from the external pressures on colleges and universities to collect and act on accurate data are internal movements with similar goals and means. Institutional research (IR) offices on college and university campuses, one of the central nexuses for data collection and analysis, have grown tremendously in size and complexity over the past 50 years (Volkwein, 2011). Although IR offices collect and share immense amounts of data, a somewhat parallel track of data collection and use has grown through admissions offices, evolving into the complex and high-stakes use of analysis and modeling practices of enrollment management (Johnson, 2000). Most recently, U.S. higher education has witnessed the growth of "academic analytics," a practice that focuses on technology-enabled "analysis of data to help educational institutions monitor progress on key institutional goals, such as student retention, faculty productivity, and the impact of outreach and engagement" (EDUCAUSE, 2012).

Statement of the Problem

U.S. colleges and universities are under tremendous pressure to collect and monitor data from and about undergraduate students. These data must be accurate and timely and the methods used to collect the data must be efficient. Self-administered surveys are a primary means of gathering these data; in fact, surveys are sometimes mandated as the primary means of collecting important data (e.g., the *First Report of the White House Task Force to Protect Students From Sexual Assault* calls for colleges and universities to conduct a campus climate survey as it is "the best way" to "know the extent of [sexual assault]" (p. 2, 2014)). These pressures have driven institutions to use the World Wide Web as a primary medium for collecting data from and about students just as researchers, pollsters, and others have done (Bethlehem & Biffignandi, 2012; Couper, 2008). Although there are no published estimates of the growth and use of Web-based surveys on individual campuses, all of the national student outcomes and experiences surveys identified by the National Institute for Learning Outcomes Assessment (2012) are available as Web-based surveys; one of the surveys, the Student Experience in the Research University (SERU) Survey, is only available online (Center for Studies in Higher Education, 2012) and beginning in 2013 this will also be the case for the National Survey of Student Engagement (NSSE) (Kinzie & Gonyea, 2012). This is no surprise given the many potential advantages of a Web-based survey: low cost, fast, efficient, flexible, reduced costs for data entry, and wide geographic reach (Sue & Ritter, 2012).

Although Web-based surveys have many advantages, they do not guarantee that those surveys collect accurate data. For example, the different experiences that students have had in accessing and using the Internet may affect how students respond to these surveys if they respond at all. In particular, students who have had less access to and experience with the

Internet may be less likely to participate in Web-based surveys. This would introduce error into the survey data at (a) aggregate levels – academic departments, colleges, institutions, etc. – which would be flawed as they would not capture the experiences and opinions of these students and (b) the individual level where it would be very difficult to identify and serve these students if they do not participate in Web-based surveys. Most importantly, the history, economics, and culture of the U.S. suggest that these students would disproportionately be students of color and students from low income families. We could be missing the voices of the students who have historically been excluded from higher education and are most in need of additional support and encouragement.

Purpose of the Study

The purpose of this study is to determine if students with different experiences of Internet access and use respond to a Web-based survey in proportions different enough to affect the use and interpretation of the survey results. In particular, this study hypothesizes that students who have used the Internet less and had fewer or lower quality opportunities to access the Internet may participate in Web-based surveys in lower proportions. This study examines whether these students can be easily identified and if they have a systematically lower response rate, potentially informing policies and practices guiding how and whether students are surveyed to collect information from them.

Guiding Research Questions

This dissertation employs the methods described by Bethlehem, Cobben, and Schouten (2011) to explore non-response bias, namely bivariate analyses and logistic regression to determine the relationships among a set of variables and survey response. Previous researchers (e.g., Dey, 1997; Hutchinson, Tollefson, & Wigington, 1987; Porter & Umbach, 2006; Porter &

Whitcomb, 2005) have identified demographic characteristics that play a role in survey response rates. Using research done by communication scholars and sociologists (e.g., Ito et al, 2010; Palfrey & Gasser, 2008; Watkins, 2009), this study uses a new, brief survey instrument to add a new variable to the study of survey non-response: Internet access and use. Specifically, this dissertation asks:

RQ1: What are the different patterns of Internet-connected computer ownership, access, and use within a sample of undergraduate students at U.S. institutions of higher education?

RQ2: Does this Web-based survey exhibit a significant non-response bias based on students' previous computer ownership, access, and use experiences?

Significance of the Study

This study applies knowledge of Internet access and use in the context of U.S. higher education to the problem of non-response on a Web-based survey. In doing so, this study contributes to the literature in three primary ways. First, it contributes to the body of theory by bridging three bodies of literature: (a) communication, sociology, and anthropology literature focused on Internet access and use, (b) higher education literature focused on student success and institutional accountability, and (c) psychology and statistics literature focused on survey methodology, particularly non-response bias. Second, it contributes empirical data and approaches by operationalizing and studying Internet access and use, a phenomenon that has almost exclusively been qualitatively described using ethnographic methods. Third, it contributes to the practice of collecting data using Web-based surveys by helping researchers identify students who have had different levels of Internet access and use prior to matriculation and understanding how that impacts their proclivity to participate in a Web-based survey.

Key Definitions

Key terms and ideas in this dissertation are listed below. They are each explained in detail with appropriate citations in the remaining chapters of this dissertation. However, they are included here to provide a very broad introduction to the important ideas in this study.

- Auxiliary variables: Variables that describe respondents but are not the specific target of the survey in question; these variables typically include demographic characteristics such as gender, race/ethnicity, age, etc.
- Beginning Survey of Student Engagement (BCSSE): Survey administered to incoming first-year undergraduate students; demographic data were obtained from this survey and additional Internet access and use questions were added
- Cluster analysis: A statistical method to group respondents who are similar
- Digital divide: The term used to acknowledge that some people have access to the Internet and others do not; somewhat outdated as it is implies all-or-nothing access
- Logistic regression: A statistical method to understand how several factors affect a binary outcome e.g., whether people complete a survey
- National Survey of Student Engagement (NSSE): Survey administered to first-year and senior undergraduate students; primarily administered over the Web
- Non-response bias: The error potentially introduced to survey results when one or more groups of people do not participate in a survey or participate in disproportionately low numbers (note that this is technically unit non-response bias; item non-response bias also affects survey quality but this study solely focuses on unit non-response bias)

- Participation gap: The term used to describe the impact of different levels of access and use of the Internet; more nuanced than the all-or-nothing idea of the digital divide that focuses only on access
- Target variables: The variables that are the primary focus of a given survey e.g., for the National Survey of Student Engagement, the target variables are measures of student engagement

Overview of Dissertation

This study examines the relationship between undergraduate students' (a) prior Internet access and use experiences and (b) predilection to respond to a Web-based survey. This study shows how students with differing levels of prior Internet access and use experiences can be identified. Further, this study shows that students who have had less use of and access to the Internet are as likely to respond to a Web-based survey as their peers with more use of and access to the Internet.

The first chapter establishes the significance of the study and its importance. The second chapter further builds the foundation for the study with an overview of existing literature. First, I describe survey methodology with a specific focus on non-response bias. I follow this with a discussion of Internet access and use in the United States, framed by the concepts of the digital divide and participation gap. A brief introduction to the two national surveys – the National Survey of Student Engagement and the Beginning College Survey of Student Engagement – from which much of the data used in this study follows. Lastly, I tie these ideas together with a description of a key study that is in some ways a precursor to this dissertation.

In the third chapter I describe the sources of data and methods of analysis used in this study. I also describe characteristics of the study population and sample in chapter three.

Chapter four is a presentation of the results of this study. In the fifth and final chapter I return to the research questions, discussing them in the context of the results described in chapter four. Chapter five also includes limitations of this study, suggestions for future research, and theoretical and practical implications of this work.

Chapter Two: Literature Review

In this chapter, survey unit non-response bias is linked with the concepts of the digital divide and the participation gap. This is accomplished by first discussing survey methodology with a specific focus on non-response bias, the potential impact of non-response bias on survey data, and possible causes of non-response bias. Many of these causes are linked to non-respondents' past experiences, society, and culture, factors that are also crucial in discussions of the digital divide. Second, the issues of Internet access and use are discussed, particularly as they are conceptualized by the ideas of the digital divide and the participation gap. Third, two surveys of college student engagement that were used in this study are described. Finally, a critical study that links non-response bias and Internet access is discussed in some detail to provide preliminary empirical evidence supporting the central hypothesis of this dissertation and the importance of definitively answering my research questions.

Non-Response in Survey Methodology

Error frameworks. Two frameworks of survey error dominate modern survey methodology: Tailored Design Method (TDM) and Total Survey Error (TSE). Although the frameworks encompass many of the same basic elements, those elements are grouped differently. The frameworks differ primarily in that TDM is largely descriptive and pragmatic whereas TSE is quantitative and formal. Most important for this study is that unit non-response is a source of error in both of these frameworks and thus something to be minimized or at least acknowledged no matter which framework is favored. Regardless of the other sources of error described in the model favored by individual survey researchers and administrators, "Nonresponse is a worldwide problem. Survey researchers everywhere are confronted by it, and the problem seems to be rising over time." (Bethlehem, Cobben, & Schouten, 2011, p. xi).

Tailored Design Method. TDM is a method of designing survey processes to maximize response rates and minimize error. Originally introduced by Don Dillman in 1978 as the Total Design Method, this widely-used and influential method guides the design of surveys from creation to administration and includes details such as the wording of questions, language used in invitation letters, and the number and type of follow-up messages. The hallmark of TDM is that it advocates that surveys should be "tailored to most effectively and efficiently deal with the contingencies of different populations and survey situations" (Dillman, Smyth, & Christian, 2009, p. 12). The current iteration of TDM described by Dillman, Smyth, and Christian (2009) in the 3rd edition of *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method*, describes four sources of error:

- Sampling error: Error caused by only surveying some (randomly selected) members of the population.
- Coverage error: Error caused by not allowing all members of the population an appropriate chance of being sampled.
- Measurement error: Error caused by problematic (poorly worded, incorrectly ordered, etc.) questions.
- Nonresponse error: Error caused by differences between respondents and nonrespondents.

Total Survey Error. TSE is a "conceptual framework describing statistical error properties of sample survey statistics" (Groves & Lyberg, 2010, p. 849). Described by some authors as the dominant paradigm in survey methodology (Groves & Lyberg, 2010; Weisberg, 2005), TSE attempts to unify concepts from measurement and psychometrics, quality assurance and management, and sociology. TSE is strongly linked to classical test theory with its focus on

error, "the deviation of a survey response from its *underlying true value* [emphasis added]" (Biemer, 2010, p.817).

In contrast to TDM which is closely associated with one prominent scholar, TSE has been under active development by many scholars (e.g. Biemer & Lyberg, 2010; Brackstone, 1999; Weisberg, 2005). One result of this continuous development and refinement is inconsistent classification of sources of error. For example, Weisberg (2005) organizes types of survey error into three major categories:

- Respondent selection issues: Sampling error, coverage error, and nonresponse error at the unit level
- Response accuracy issues: Nonresponse error at the item level, measurement error due to respondents, and measurement error due to interviewers
- Survey administration issues: Postsurvey error, mode effects, and comparability effects

In contrast, Groves et al. (2009) used TSE to identify and classify seven types of survey error and the stage in survey administration in which each error can be introduced using a "quality perspective" in *Survey Methodology* (see Figure 2.1).

Non-response bias. In every voluntary survey, some persons may be unable to participate or they may choose to not participate. These non-respondents may choose to not participate for many different reasons, some of which are related to survey design and others related more closely to cultural norms and expectations. When the non-respondents differ significantly from the survey population in ways that affect the survey data, the resulting errors are said to be the result of "non-response bias" (Dillman, Eltinge, Groves, & Little, 2002;

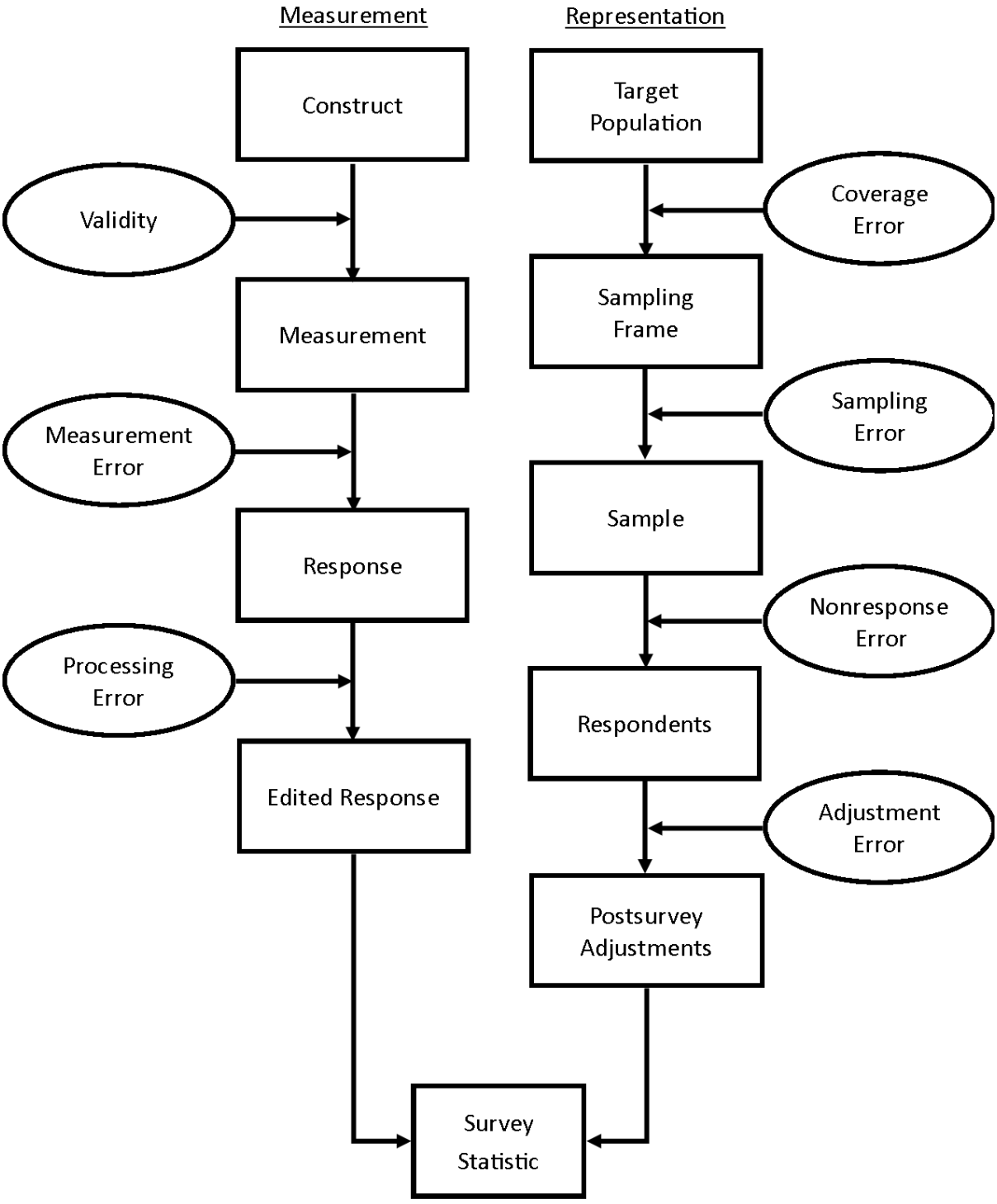

Figure 2.1. Sources of survey error in TSE. Adapted from *Survey Methodology* by Groves et al., 2009, p. 48. Copyright 2009 by John Wiley & Sons, Inc.

Dillman, 2007; Goyder, 1987). Although they differ in many details, both frameworks described previously include non-response bias as a prominent source of error. Although there are statistical procedures that attempt to correct for non-response error, including weighting (Bethlehem, 2002; Fuller, 1974; Mandell, 1974) and imputation (Lee, Rancourt, & Särndal, 2002; Zanutto & Zaslavsky, 2002), these procedures are often complex and it usually remains the better option to reduce non-response bias at the outset (Bethlehem, 2002).

It is also important to distinguish between undercoverage and non-response bias. Undercoverage occurs when people in the population are not included in the sampling frame; although researchers intend to study those people, those people do not participate in the survey because they can never be included in the sample. Undercoverage is particularly problematic for Web-based surveys because people without access to the Internet will never be included in the sampling frame even if the results of the survey are intended to be generalized to a population that includes those without Internet access (Bethlehem & Biffignandi, 2012). In contrast, non-response bias occurs when people are included in the sampling frame and the sample but they choose to not participate. Although undercoverage and non-response bias share many similarities, this study only explores non-response bias, primarily because I assume that all students attending the colleges and universities in this study have Internet access.

Definition. Non-response bias is the error introduced into the results of a survey when two conditions are met (Bethlehem, Cobben, & Schouten, 2011; Dillman, Eltinge, Groves, & Little, 2002). First, there must be an identifiable group or groups in the survey population who are under- or overrepresented in the sample. Second, these groups must differ from one another in ways that are important in the context of the phenomenon being explored in the specific survey.

Before continuing, it may be helpful to introduce an example of non-response bias. One of the surveys conducted by the U.S. Census Bureau is the Current Population Survey (CPS). The CPS collects detailed information about households, particularly details about employment and income. These data are used by the federal government as "the official source of national poverty estimates" (U.S. Census Bureau, 2012, p. 4). A 2006 study of CPS data from 1998 to 2004 found a non-response bias: lower income households were less likely to participate in the survey. This problem affected the estimates produced by the U.S. Census, undercounting the number of lower income households and artificially inflating estimates of income in the U.S. The authors of this study estimate that the U.S. Census reported a median income per person of $19,333 when the true median income was $17,085. Non-response bias led the U.S. to significantly underestimate the amount of poverty experienced by its citizens (Korinek, Mistiaen, & Ravallion, 2006).

There are three fundamental causes for invited participants to not reply to a survey (American Association for Public Opinion Research, 2011; Bethlehem, Cobben, & Schouten, 2011; Lynn et al., 2002). First, those administering the survey may be unable to contact potential respondents. For Web-based surveys, this may mean that potential respondents may not have access to e-mail, perhaps because the survey administrators have incorrect e-mail address information for some people in their sample. Second, they may be unable to participate even if they are willing e.g., they may be sick or busy. Third, they may simply choose to not participate. (Confusingly, the literature is unclear on precisely why the first two situations are typically classified as non-response and not undercoverage.)

Impact. At its most basic level, non-response bias has the potential to affect survey data by skewing the results of statistical inferences and estimates drawn from the collected data

(Bethlehem, Cobben, & Schouten, 2011; Dillman, Eltinge, Groves, & Little, 2002). Much of the discussion of non-response bias remains rooted in statistical analysis and computation, focusing primarily or exclusively on the impact of non-response bias on population estimates (Groves, 2006; Groves & Peytcheva, 2008). In describing the impact of nonresponse on the quality of survey estimates, Groves et al. (2009) note that, "For some decades, the dominant goal of survey researchers was to minimize nonresponse rates" (pp. 188-189). Importantly, Goyder (1987) broadened the discussion beyond its statistical impact on population estimates to focus on non-response bias as a threat to the reliability of the field of survey research itself: "The title of this book [The Silent Minority] alludes to the danger that the social science built upon the results of survey research remains deaf to the nonrespondent minority who, unlike most minorities, deliberately remains silent" (p. 6). Researchers in higher education, concerned with both survey data quality and social justice, have taken these concerns to heart and conducted studies to identify survey non-respondents among college and university students (Hutchinson, Tollefson, & Wigington, 1987; Porter & Whitcomb, 2005; Sax, Gilmartin, & Bryant, 2003).

The decision to respond. Historically, survey methodology has strong roots in experimental design but weak roots in theory (e.g. Hawkins, 1975; Berk, 1983; Goyder, 1987). To understand the complicated issues related to non-response bias, survey methodologists have turned to sociological and psychological theories that purport to explain why individuals choose to respond. Although other psychological models such as Maslow's hierarchy (Cape, 2006) and influence theory (Cialdini, 1984; Groves, Cialdini, & Couper, 1992) have been applied to survey response, the most prominent theories are social exchange theory and leverage-salience theory. Social exchange theory appears to have been used by survey methodologists longer although neither theory seems to be dominant.

Social exchange theory. To explain survey response and non-response, Dillman, Smyth, and Christian (2009) present extensive evidence in favor of social exchange theory, a theory that seeks to understand survey participation in terms of rewards, costs, and trust. Put most simply, social exchange theory says that people perform voluntary actions because they expect there to be a payoff (Blau, 1964). These ideas are often rooted in and influenced by participants' culture, quantified through demographic and background characteristics such as race, ethnicity, and gender (e.g. Johnson, O'Rourke, Burris, & Owens, 2002; Goyder, 1987).

Leverage-salience theory. Another theory that has been used to explain why some people choose to participate in surveys and others choose to not participate is leverage-salience theory (Groves, Singer, & Corning, 2000; Groves et al. 2009). Leverage-salience theory explains this decision in terms of the salience of the survey to each individual, a salience that differs for each person since each person places different levels of importance on different features of the survey. Bethlehem, Cobben, and Schouten (2011) describe this theory, particularly as applied by Goyder, as a "synthesis in the social exchange theory for both the behavioral and the voluntary viewpoint" (p. 65), an approach they contrast with Dillman's "more narrow view" of social exchange theory.

Factors influencing non-response. In their review of previous survey methodology literature describing factors that influence survey participation, Groves, Cialdini, and Couper (1992) describe five sets of characteristics: societal-level factors, attributes of the survey design, characteristics of the sample person (the most widely researched area), attributes of the interviewer, and respondent-interviewer interaction. The last two factors are diminished or non-existent in the context of self-administered Web-based surveys but the first three have remained prominent in non-response research. Of course, these factors are often entangled and difficult to

distinguish from one another cleanly. This dissertation follows in the footsteps of the many studies that have focused on respondent characteristics, particularly socio-economic status (SES), gender, race/ethnicity, and age. Societal-level factors are beyond the scope of this study and require different methods to study. The design attributes of these surveys were fixed so those factors were also omitted from this study.

Socio-economic status. Notable among the specific factors explored by survey methodologists is culture (Johnson, O'Rourke, Burris, & Owens, 2002) and SES (Goyder, Warriner, & Miller, 2002). Although some studies do not adequately account for the greater access researchers enjoy with middle and upper-middle class people, most studies have found a positive correlation between SES and propensity to respond to mailed surveys (Clausen & Ford, 1947; Franzen & Lazarsfeld, 1945; Goudy, 1976; Rosenthal & Rosnow, 1975), face-to-face interviews (Benson, Booman, & Clark, 1951; Champion & Sear, 1969), and telephone surveys (O'Neil, 1979; Tucker, 1983).

Gender. Although many individual studies have found a relationship between gender and response propensity, metastudies synthesizing the individual studies present a more muddled picture. In summarizing several decades of research into nonresponse bias, Goyder (1987) concludes that although "there is much evidence on male-female bias in surveys…sex nevertheless seems to be among the most ambiguous of socio-demographic correlates of response" (p. 85). Similarly, Smith (1983) describes the empirical studies of gender and survey response as "divided."

Race/ethnicity. The broad body of research suggests that, at least in the U.S., non-White people are less likely to respond to surveys. This is best shown by a 2002 metastudy by Johnson, O'Rourke, Burris, and Owens of 26 studies of nonresponse bias. This metastudy revealed large

agreement among the reviewed studies that minorities were less likely to participate in surveys. For example, a 1999 study by Singer, Groves, and Corning focused on survey incentives but also found a significant difference between the response rates of Black and non-Black respondents.

Age. Research relating age to propensity to respond to surveys is mixed, perhaps because age has historically been closely related to access as older people have generally been easier for interviewers to contact particularly via telephone. Some research has found that younger people are more likely to respond to surveys (e.g. Gannon, Nothern, & Carroll, 1971; O'Neil, 1979; Smith, 1983). However, other research has found that older people are more likely to respond (e.g. Filion, 1975) or that age has no effect on response propensity (Mayer & Pratt, 1967).

Non-response among college students. Given the immense breadth of this literature and its lack of consensus in some areas, it is helpful to focus directly on notable studies of college students' propensity to respond to surveys. In their 1987 study of non-response bias of college freshmen to a mail survey, Hutchinson, Tollefson, and Wigington conducted a follow-up telephone interview to determine if there was significant non-response bias in their study. Males and "low achievers" exhibited a lower response rate but this did not seem to produce a non-response bias as mean scores were not affected. Sax, Gilmartin, and Bryant (2003) expanded beyond paper surveys to explore nonresponse bias in both paper and Web-based surveys of college students using the Your First College Year survey, a large national survey of first-year students. In exploring these two modes of survey administration, they found results that were complex and difficult to describe and explain. Sax, Gilmartin, and Bryant close their paper with a warning that "an online survey is a methodological alternative to a paper questionnaire, but not necessarily a more fruitful one" (pp. 425-426).

Porter and Whitcomb's 2005 article *Non-Response in Student Surveys: The Role of Demographics, Engagement and Personality* is among the most informative pieces examining non-response among college students. Their summary of response patterns found in previous research indicates that "survey response is greatest for females, Whites, more affluent individuals, and those having higher levels of academic preparation, academic achievement, and engagement" (p. 136). By comparing the results of four different surveys, Porter and Whitcomb found empirical evidence supporting the previous research and discovered that student personality also plays a strong role in predicting survey response and non-response. In a 2006 article, Porter and Umbach described similar findings with high ability students, women, and white students more likely to respond to surveys. They also noted that response rates vary across institutions with some institutions such as selective institutions and women's colleges tended to systematically have higher response rates.

Detecting and correcting non-response bias. The fundamental issue with non-response bias is determining whether the survey responses are generalizable to the target population. There are three situations in which survey data are missing (Bethlehem, Cobben, & Schouten, 2011; Bethlehem & Biffignandi, 2012; Groves et al., 2009):

1. Missing Completely at Random (MCAR): Missing responses are unrelated to the phenomenon in question and auxiliary variables.
2. Missing at Random (MAR): Missing responses are related only to the auxiliary variables.
3. Not Missing at Random (NMAR): Missing responses are directly related to the phenomenon in question. Groves et al. (2009) refer to this situation as the "nonignorable condition of nonresponse."

In the MCAR situation, there is no non-response bias because the responses are missing at random and not systematically. In the MAR situation, there may be a non-response bias but it may be correctable using weighting techniques using the auxiliary variable(s). In the NMAR situation, there may be a non-response bias and it may not be correctable. To determine if data are MAR or NMAR, I analyzed the bivariate and multivariate relationships between the auxiliary variables and the target variables; the specific details of these analyses will be presented in Chapter Three.

Non-response bias is typically corrected by weighting responses from individuals such that those responses are represented in the survey data in proportions similar to those found in the target population. The data used to determine the weights can be drawn from information internal to the survey or data sources external to the survey (e.g., census data); these data are labeled "paradata" by some researchers (e.g. Dillman, Eltinge, Groves, & Little, 2002; Bethlehem, Cobben, & Schouten, 2011) and this approach is described as a "linked-records approach" by others (e.g. Goyder, Lock, & McNair, 1992; Porter & Whitcomb, 2005). More sophisticated approaches rely on response propensity calculations that use predictions of response probability, a method that may be most effective for reducing or removing non-response bias related to background variables (Rosenbaum & Rubin, 1983; Little, 1986).

The Digital Divide and Participation Gap

This section discusses issues of Internet access and use. It opens with an overview of the digital divide, including its prevalence in the United States, its prevalence among college and university students, and criticisms of the digital divide construct. Next is a description of the participation gap, a more nuanced advancement of the digital divide that also encompasses how the Internet is understood and used. This section closes with a discussion of the role of mobile

devices in the understanding and development of these ideas. Many of the statistics presented in this section will focus on data from 2009 as the data for this study were collected in 2010 with the Internet access and use questions asking about the previous year.

Digital divide. To effectively use any information and communication technology (ICT), one must have access to it. In the context of the Internet, the unequal access experienced by persons has historically been framed as the digital divide, a dichotomy between those who physically have access to the Internet and those who do not (Birdsall, 2000; Lynch, 2002). First coined by U.S. Assistant Secretary of Commerce for Telecommunications and Information, Larry Irving (Miller, 2001), this divide has found its widest use as a lens through which public policy has been debated and shaped both in the United States (National Telecommunications and Information Administration, 1995, 2000) and abroad (International Telecommunication Union and United Nations Conference on Trade and Development, 2007; Stewart, Gil-Egui, Tian, & Pileggi, 2006). Hence this literature review will be restricted to a subset of the digital divide literature as this study is not concerned with international, national, or regional telecommunications policies. This section will begin with a brief overview of the concept of the digital divide, proceed with descriptions of the prevalence of the digital divide in the United States and American colleges and universities, and close with a summary of the criticisms of the usefulness of the digital divide as a concept.

Overview. The term "digital divide" was first used in the influential *Falling Through the Net* series of reports analyzing U.S. Census data detailing Americans' access to and ownership of ICTs and ICT infrastructures (Miller, 2001). The first African American appointed to head the National Telecommunications and Information Agency (NTIA), Larry Irving, drew national attention to new disparities between the privileged and the poor (disparities that often fall along

lines of race and ethnicity in the United States) when he wrote in the fourth *Falling Through the Net* report that "the Digital Divide [is] the concept that the society should not be separated into information haves and information have-nots" (National Telecommunications and Information Administration, 2000, p. 1). Stewart, Gil-Egui, and Pileggi (2002) analyzed those NTIA documents and noted that the definitions and concepts used were closely related to technology and the economic marketplace. In that context, the digital divide was often presented as a "workforce deficit." Further analysis (Stewart, Gil-Egui, Tian, & Pileggi, 2006) of state-produced documents showed a convergence towards market-based issues in both America and the European Union.

Some academics have continued to use definitions of the digital divide that are not deeply rooted in economics, similar to Lynch's (2002) characterization that "the early approach to a definition [was that] the digital divide separated those who have access to the Internet from those who do not" (p. 4). In introducing their study of marginalized members of society and their use of computers and the Internet, Mehra, Merkel, and Nishop (2004), Information Science faculty at U.S. research universities, described the digital divide as "the troubling gap between those who use computers and the Internet and those who do not" (p. 782). Other scholars offer broader conceptions of the digital divide, such as Hargattai's (2002) characterization of the digital divide as "inequalities in access to the Internet" (p. 2) and her expansion of the divide to explicitly encompass both use and access; this and other broader conceptions of the digital divide will be explored in detail later in this literature review.

The digital divide has attracted significant attention by being positioned as an issue of civic and economic inequality. Fink and Kenny (2003), associated with but not representing the World Bank, wrote that the digital divide was "leaving the developing world behind, with

potentially cataclysmic consequences in terms of development prospects" (p. 1). Andy Carvin, Senior Associate at The Benton Foundation, described the digital divide as "one of the most important civil rights issues facing our modern information economy" (2000, p. 5). In *The Wealth of Networks*, Yochai Benkler's (2006) ambitious and influential discussion of the nature of networked power and its affordances, Benkler writes that the digital divide tempers his enthusiasm for the Internet as a democratizing technology.

Prevalence in the United States. Although this study focuses on American college and university students, it is one of the central assumptions of this study that neither American colleges and universities nor their students exist in a vacuum. They are affected not only by their histories but also their surroundings. Hence it is particularly important for readers of this study to have some understanding of computer ownership and Internet access enjoyed in the households from which students matriculate to colleges and universities. The data presented here come primarily from two reliable sources of large-scale longitudinal data: The United States Census's Current Population Survey (CPS) and the Pew Internet & American Life Project.

Each month, the U.S. Census Bureau conducts a survey of approximately 50,000 households representative of the entire U.S. population. A joint effort of the U.S. Census Bureau and the U.S. Bureau of Labor Statistics, the Current Population Survey (CPS) often includes supplemental questions focusing on specific topics (U.S. Census Bureau, 2009a). The Census asked respondents about computer ownership and Internet access in the CPS and other surveys conducted in 1997, 2000, 2001, 2003, and 2007 (U.S. Census Bureau, 2009b, 2009c). Computer ownership and Internet access has increased: in 2003 61.8% of all respondents reported owning a computer and in 2007 61.7% reported having Internet access at home which implies that more than 62% owned computers. However, there are significant disparities when these data are

examined more closely. Specifically, those who do not have Internet access at home were disproportionately underemployed, less educated, and Black or Hispanic (U.S. Census Bureau, 2009c). Even when considering Internet access outside of the home, those same disparities still prevailed (U.S. Census Bureau, 2009b).

The Pew Internet & American Life Project (Pew Internet Project) is a project of the Pew Research Center, a center hosting seven research projects funded by the Pew Charitable Trusts (Pew Internet & American Life Project, 2009a). Since its founding in 2000, the Pew Internet Project has regularly conducted research to monitor the online activities of Americans (Pew Internet & American Life Project, 2009b). The surveys conducted by the Pew Internet Project in 2009 yielded data very similar to that obtained by the U.S. Census: although most populations indicated increased access (76% of all respondents reported owning a computer and 63% reported having a broadband Internet connection at home), those who did not have Internet access at home were disproportionately older, poorer, less educated, and living in rural areas. In particular, African Americans continued to report below-average broadband adoption and access (Horrigan, 2009; Pew Internet & American Life Project, 2009c).

Prevalence in U.S. colleges and universities. The previous section makes it clear that although many Americans own computers and have access to the Internet at home, many still do not. However, it is not entirely clear from those surveys if undergraduate college and university students have different levels of computer ownership and access and if such disparities mirror those found in the larger population. Authoritative sources that focus specifically on college student computer ownership and access are discussed below.

Each year, EDUCAUSE, the largest and most prominent professional organization for information technology professionals in higher education, conducts several efforts to measure

student technology usage and ownership. In 2009, EDUCAUSE collected data from the Chief Information Officers (CIOs) at 927 member organizations for the annual update to EDUCAUSE's Core Data Service. These individuals or their delegates reported that between 80% and 90% of their students own their own computers, indicating that between 10% and 20% do not. All responding 4-year institutions reported providing high-speed Internet access in their residence halls but no data were collected regarding (a) the number of students residing off-campus and (b) the availability of high-speed access off-campus (EDUCAUSE, 2009). Although CIOs or their delegates provided these data to EDUCAUSE, it is unclear how each respondent collected the data at his or her institution.

EDUCAUSE's research arm, the EDUCAUSE Center for Applied Research (ECAR), has conducted its own focused study of undergraduate students and information technology annually since 2004. In their 2009 Study of Undergraduate Students and Technology, ECAR reports that 98.8% of the 30,616 students at the 115 colleges and universities who participated in its survey reported owning a computer (Smith, Salaway, & Caruso, 2009). In their 2007 Net Generation survey of 7,705 undergraduate students at seven institutions, Junco and Mastrodicasa reported similar results when 97.3% of their respondents indicated that they own a computer. Both of these surveys suffer from some significant limitations: (a) both surveys had very low response rates (10.4% for ECAR and 8.7% for the Net Generation survey) and (b) both surveys were administered online, a condition that this dissertation hypothesizes may result in significant non-response bias.

Criticism of the Digital Divide Dichotomy. Many researchers have criticized the usefulness and utility of the digital divide dichotomy. These criticisms have largely centered on the simplicity of the dichotomy. Some have suggested that the simplicity reduces the usefulness

of the concept both as a methodological lens and a tool to shape policy (Gunkel, 2003; Warschauer, 2002) and others have suggested that it is actively harmful given its many limitations (Young, 2001). Some have suggested that enlarging the concept to embrace not only access but also use would make it more powerful and useful (Hargittai, 2002; Selwyn, 2004), explicitly recognizing the role that society and culture have played in shaping access.

Participation gap. In 2006, media scholar Henry Jenkins advanced the concept of the "participation gap" partially in response to the critiques of the digital divide dichotomy (2006a, 2006b). This idea goes beyond the digital divide and its focus on access by explicitly acknowledging that even those who have had access to technology have had different experiences with it and have thus gained different skills, predilections, and comfort levels with different technologies. Just as recommended by critics of the digital divide (Hargittai, 2002; Selwyn, 2004), the participation gap embodies a more nuanced idea embracing not just mere access but differing types of access.

Although the basic idea that social and cultural characteristics are related to technology use and comfort is not new (Hargittai, 2002; Mehra, Merkel, & Nishop 2004, Selwyn, 2004), significant amounts of work focused specifically on adolescents' access to and use of the Internet have been done by qualitative researchers, particularly those funded by the John D. and Catherine T. MacArthur Foundation's Digital Media and Learning Initiative. For example, small groups of researchers have described how American teens with computers and Internet access in their homes use tools such as Facebook and MySpace differently than teens who access the Internet from different locations such as school or the public library (boyd, 2008; Weber & Mitchell, 2008). More impressively, this initiative funded ethnographic work by over a dozen ethnographers who studied how hundreds of youths in America use technology to play, socialize,

and learn (Ito et al., 2008; Ito et al., 2010). These researchers have offered rich examples of the complex world in which today's youths live and how technology is woven into their lives, providing numerous examples of how mere access to technology is insufficient without "a supporting social and cultural world" (Ito et al., 2010, p. 17), extending and enriching our understanding of technology use and access beyond the dichotomy of the digital divide. Unfortunately, this research has been almost exclusively qualitative in nature leaving the quantitative operationalization of this concept to other researchers.

Role of Mobile Devices. The role of mobile devices such as smart phones, tablets, and e-readers, etc. is unclear in many discussions of the digital divide and participation. Some of these discussions have taken an extreme dystopian view, a common occurrence in the analysis of the social effects of technology (Kling, 1994). Specifically, some scholars have expressed concern about the limitations of these devices and how those limitations will inevitably limit how people use those devices and even shape their understanding of the capabilities of the Internet. In his 2008 book *The Future of the Internet – And How to Stop It*, Zittrain presents one of the most eloquent and fully-formed arguments in this vein. He argues that the affordances of these devices make them less like multipurpose, adaptable computers that people can program and creatively use in ways limited only by their personal resources (*generative* devices) but more like appliances whose uses are very limited (*non-generative* devices). Central to this argument is the idea that the limitations of those devices will prevent people from ever exploring their creative uses and thus shape their very understanding of the Internet and mobile devices. In short, he fears that these devices will turn people into mere consumers of information and creative works instead of allowing them to be creators of information and creative works. Although Zittrain is not alone in having these concerns (e.g., Jenkins, 2006a; Parry, 2010), these concerns have not

been substantially explored in empirical studies and the role of mobile devices in the participatory divide is unclear.

Despite these concerns and lack of corresponding empirical work, the prevalence of mobile devices is undeniable. In 2009, the year in which the initial data for this study were collected, the Pew Internet & American Life Project reported that 85% of adults in the U.S. owned a mobile phone (Pew Internet & American Life Project, 2009c). Similarly, ECAR's 2009 *Study of Undergraduate Students and Information Technology* found that over half (51.2%) of undergraduate students in the U.S. had mobile devices with another 11.8% planning to purchase one in the next year (Smith, Salaway, & Caruso, 2009). Although these devices are very prevalent, it is not entirely clear how best to integrate them into a quantitative survey. The best effort to include mobile technology in an all-encompassing categorization of Internet users is a complex one developed by the Pew Internet & American Life Project in 2009. However, this effort heavily incorporated attitudinal factors about technology (e.g., enthusiasm for technology, attachment to technology) that are not well suited for this study as they do not seem to be central to my specific concerns (Pew Internet & American Life Project, 2009d).

Student Engagement Surveys

This study employs data from two related surveys of U.S. undergraduate students at four-year colleges and universities: The National Survey of Student Engagement (NSSE) and the Beginning College Survey of Student Engagement (BCSSE). These surveys are administered annually by researchers at Indiana University to students at institutions who pay to participate in the surveys. This section describes these surveys by beginning with a brief description of NSSE and some of its measures. That is followed by a brief description of BCSSE and a description of the role these surveys play in this study as potential examples of non-response bias. Appropriate

methodological details of the administration of these surveys will be discussed in the next chapter.

National Survey of Student Engagement. NSSE is a survey annually administered to first-year and senior students at four-year colleges and universities primarily in the United States and Canada. Since its first administration in 1999, undergraduate students at nearly 1,500 colleges and universities have participated (National Survey of Student Engagement, 2011a). The survey "measures the extent to which students engage in effective educational practices that are empirically linked with learning, personal development, and other desired outcomes such as satisfaction, persistence, and graduation" (National Survey of Student Engagement, 2010b, p. 1). A complete copy of the NSSE instrument is included as Appendix C.

NSSE Benchmarks. NSSE researchers have created five measures that aggregate different questions to help administrators and faculty at participating institutions, higher education researchers, students, parents, and others understand NSSE data. These Benchmarks of Effective Excellence Practice are: Level of Academic Challenge, Active and Collaborative Learning, Student-Faculty Interaction, Enriching Educational Experiences, Supportive Campus Environment. These benchmarks summarize student responses to NSSE questions related to that topic. They are calculated using a 100-point scale to enable comparisons between institutions and across time (National Survey of Student Engagement, 2011a). However, the benchmarks are not percentages but numbers that gain meaning primarily through comparison with other benchmark scores from the same domain, particularly when effect sizes are included as part of the comparison (National Survey of Student Engagement, 2009).

Beginning College Survey of Student Engagement. BCSSE is a survey annually administered to incoming first-year students at four-year colleges and universities in the U.S. and

Canada. Since its first administration in 2007, more than 295,000 students at over 300 colleges and universities have participated in BCSSE (Beginning College Survey of Student Engagement, 2011). BCSSE is administered to "assess (1) the time and effort entering, first-year students devoted to educationally purposeful activities in high school and expect to devote during their first year of college, and (2) what these entering first-year students expect their institutions to provide them regarding opportunities and emphasis" (Beginning College Survey of Student Engagement, 2011, para. 1). A complete copy of the BCSSE instrument is included as Appendix B.

Potential examples of non-response bias. These studies provide an opportunity to explore the possibility that Web-based surveys exhibit a non-response bias related to Internet use and access. This is particularly relevant given the prominence of these surveys. Although they have been criticized by some scholars (e.g., Olivas, et al; 2009; Porter, Ruman, Pontius, 2011), these surveys, particularly NSSE, have been endorsed by many prominent scholars of higher education, including The Secretary of Education's Commission on the Future of Higher Education convened in 2006, the Carnegie Foundation for the Advancement of Teaching, and the Association of American Colleges and Universities (National Survey of Student Engagement, 2011a, 2012; The Secretary of Education's Commission on the Future of Higher Education, 2006).

It is important to note for this study that the criticisms of these surveys have largely focused on the reliability and validity of these surveys and not on non-response bias. Researchers at Indiana University have specifically studied non-response bias on NSSE and found little evidence of meaningful non-response bias. Three of these studies have been included in the NSSE Psychometric Portfolio, a collection of studies analyzing psychometric

properties of that survey. Although the earliest study (2005) found some potential evidence of systematic differences between respondents and non-responders the results were inconclusive. A more sophisticated 2010 study that employed data from BCSSE examined if students' engagement in high school or their attitudes toward engagement influenced their decision to participate in NSSE. Neither of those factors was found to predispose students to respond to NSSE (National Survey of Student Engagement, 2010b). A third study (2011b) focused in the more narrow question of whether there were systematic differences between students who chose to not participate in NSSE at all systematically differed from those who only chose to not participate in additional question sets added to the end of the core NSSE instrument. The differences between those two groups were described as "negligible" and "very unlikely to be biasing NSSE results in a substantial way (p. 2)."

Synthesis of Non-Response Bias and Digital Divide Literature

The preceding discussions illustrate that non-response bias in self-administered surveys is a significant potential source of survey error. Just as Dillman, Smyth, and Christian discussed the "unconnected" and the "poorly connected" in their 2009 survey methodology book, the material presented in this chapter demonstrates that the digital divide and the participation gap are issues that still persist on many college campuses as some students do not own or use their own computers. These two ideas collide when college students are asked to participate in Web-based surveys. Although some scholars have suspected or even assumed that there is a bias related to the use of the World Wide Web as a medium for conducting surveys, Millar, O'Neil, and Dillman's 2009 article *Are Mode Preferences Real?* provides empirical evidence. Using a quasi-experimental design, they explored mode choice among respondents to a general population survey in Washington. Specifically, they explored demographic and attitudinal

characteristics that correlated with respondents' likelihood to choose to use the Web over other response modes when completing a survey.

In late 2007 and early 2008, Millar, O'Neil, and Dillman (2009) conducted a survey of residents in two geographic areas in Washington. The sample was randomly selected and divided into six treatment groups of 300 households each. The mailings for each sample differed, placing a different emphasis on the availability of the Web option. One group was told that the paper mode was preferred, one group was not told about the Web mode until late in the survey administration, one group was told that the choice was up to them completely, and the fourth group was not told of the paper mode until late in the survey administration (data from the other two groups were not reported). In the words of the authors, "this survey experiment was designed to see if we could contact respondents through mail but then 'push' them to fill out the questionnaire on the web" (p. 10).

Critical to this study was the inclusion of a question asking respondents how they would like to complete surveys (Web, mail, or telephone). The responses to this question allowed Millar, O'Neil, and Dillman (2009) to examine correlations not only between response mode preference and other variables but also actual response mode and other variables. Using Chi-square tests, they found several behavioral and demographic-like characteristics associated with respondents who preferred the Web: more frequent Internet use, less frequent need for assistance using the Internet, less fear of computer viruses, and less fear of online scams. Using multivariate logistic regression, they were able to further explore characteristics of respondents who preferred the Web mode. Respondents who were younger, more educated, earning higher incomes, and married were more likely to prefer the Web mode. Combining the Internet-use and

demographic variables in more complex regression models yielded more complex but more powerful (i.e., higher variance explained) models.

Millar, O'Neil, and Dillman's 2009 study provides empirical evidence that the hypothesis I have been building – demographic and attitudinal characteristics may influence some college students to not respond to Web-based surveys – is plausible. These authors explored essentially the same demographic characteristics that the previously-discussed researchers, many of whom have performed qualitative work, have explored and linked to computer use. Although Millar, O'Neil, and Dillman (2009) did not (and could not, given the design of their study) specifically explore non-response bias, they expect that non-response bias does occur on Web-only surveys: "[T]he use of a web survey could result in nonresponse bias if alternate modes of response are unavailable" (p. 23). This study explores that hypothesis using data from the 2010 administration of the BCSSE and the 2011 administration of the NSSE.

Study Purpose and Research Questions

RQ1: What are the different patterns of Internet-connected computer ownership, access, and use within a sample of undergraduate students at U.S. institutions of higher education?

RQ2: Does this Web-based survey exhibit a significant non-response bias based on students' previous computer ownership, access, and use experiences?

Summary

This chapter was divided into four sections. In the first section, non-response bias was defined and its effects were explored. In particular, several factors commonly associated with non-response – SES, gender, race/ethnicity, and age – were described. In the second section, I explored the digital divide and the participation gap, two concepts used to describe access to and use of the Internet. This section described data related to these ideas, especially the digital divide, to establish their continuing relevance in the U.S. The third section introduced NSSE and

BCSSE, prominent survey instruments used in this study as potential examples of non-response bias. Finally, this literature review described a key study that explicitly link survey non-response bias with Internet access and use, laying the ground for this study that further explores that link.

Chapter Three: Methodology

When exploring non-response bias, there are two sets of data one must collect: (a) whether or not people responded to the survey and (b) information about the respondents and non-respondents so those two groups can be compared to one another. Determining whether people are respondents or non-respondents is relatively straight-forward: people either complete a survey or they do not. The second set of data is much more challenging to collect because non-respondents are people who, by definition, have failed to volunteer information about themselves.

This chapter describes how these two sets of data were collected and analyzed. First, I describe how the survey response/non-response data were collected using the Web-version of the 2011 NSSE. Second, I describe how information about the respondents and non-respondents was collected using the 2010 BCSSE and a new Internet Access and Use survey instrument appended to BCSSE. This second section includes a description of this new instrument, including its development, testing, and psychometric properties, as well as the means by which the responses to the new instrument were used to describe and categorize students. Finally, I describe how these data were analyzed using bivariate and logistic regression to determine the relationship between the descriptive data and survey response and the relationship between the descriptive data and the NSSE benchmarks.

Survey Response/Non-response Data

A study of survey non-response necessarily focuses on responses (or lack thereof) to a particular survey or collection of surveys. The survey at the center of this study is the 2011 NSSE. Given its focus on Internet access and use experiences, this study specifically examines the responses to the Web-version of NSSE.

National Survey of Student Engagement. As introduced in the previous chapter, NSSE is a survey annually administered to first-year and senior students at American and Canadian four-year colleges and universities. It is typically administered to all first-year and senior students at participating institutions using one of three modes: Web-only, Web+, or Paper (National Survey of Student Engagement, 2010b). Given the focus of this study, students were only included in this study if their institution participated in NSSE using the Web-only mode. The precise date on which the survey was opened and first advertised on each campus varied but occurred in late January or February and the survey closed on May 31. While the survey was open, students were invited to participate by individualized e-mail messages sent by Indiana University survey administration staff and broader advertisements created by individual institutions. Each student was contacted by e-mail a maximum of five times (National Survey of Student Engagement, 2011c). If the institutions provided a secondary e-mail address for students, the first two messages were also copied to that e-mail address (National Survey of Student Engagement, 2011d).

Response and non-response data. Individuals in the NSSE sample were coded as having completed the survey, partially completed the survey, refused to participate, or ineligible using the standards published by the American Association for Public Opinion Research (2009). This study follows the conventions of NSSE by coding respondents as having completed the survey when they advanced through all of the questions prior to the demographic questions, approximately the first three-quarters of the survey. Those who partially completed the survey but did not reach the demographic questions, declined to participate, or simply never responded or participated at all as classified as non-respondents (National Survey of Student Engagement, 2011e). This decision to code partial respondents as non-respondents limits this study to one

about unit non-response and not item non-response. This also limits the focus of this study to those students who provided substantial, meaningful information that is usable by practitioners. Additionally, students who were included in the sample but not contacted (missing, incorrect, or otherwise unusable e-mail addresses), and students who participated in BCSSE but later left the institution (as determined by their absence from the NSSE population file) were removed from the sample.

Demographic and Internet experience information. As described in Chapter Two, studies of survey non-response always occur in a specific context, focusing on particular characteristics of the survey population – respondents and non-respondents – that are theorized or known to affect their predilection to respond to the survey. However, because survey non-respondents do not provide information through the survey, information about them must be collected some other way. In this study, information about the population was collected using BCSSE, a survey with a very high response rate that was administered several months prior to NSSE. This is similar to the approach used in a previous study of non-response bias on NSSE conducted by Indiana University researchers (National Survey of Student Engagement, 2010a). In addition to the demographic questions on BCSSE, an additional 1-page survey instrument was appended to the BCSSE instrument to collect information about Internet access and use experiences.

Beginning College Survey of Student Engagement. BCSSE, also introduced in the previous chapter, is a survey annually administered to incoming first-year students at American and Canadian four-year colleges and universities. It is administered to first-year students prior to or immediately after beginning their first semester or quarter, typically during summer orientation or during the first week of class. Although precise response rates cannot be

calculated because BCSSE is locally-administered by each campus using individualized plans and methods, participating institutions routinely report that the timing of the survey typically results in a very high response rate because its target population of new incoming first-year students is very compliant (J. Cole, personal communication, April 2009). Although some first-year students do not participate in summer orientation or otherwise are not presented with the opportunity to participate in BCSSE, the high response rates from students asked to participate in BCSSE ensures that data are collected from most first-year students. Across all eight institutions that participated in this study, 72.7% of all of their first-year students participated in BCSSE; at the institution level, between 49.2% and 97.7% of first-year students participated.

Like NSSE, BCSSE can be administered using only the Web, only paper materials, or a combination of the two (Beginning College Survey of Student Engagement, 2010). One of the hypotheses of this study is that Web-based surveys suffer from a non-response bias so only institutions using the paper mode of BCSSE were included to avoid this potential source of error. The additional Internet Access and Use survey instrument, a 1-page instrument, was appended to each BCSSE survey at the participating institutions; it is appended to this study as Appendix A.

Demographic data. Demographic data were collected via BCSSE. Specifically, this study draws on BCCSE questions about demographic factors known to affect predilection to respond to surveys, including socioeconomic status, age, gender, and race/ethnicity. BCSSE asks about parental education levels which are combined to determine if a respondent is a first-generation college student and that is used in this study as a proxy for socioeconomic status (Goyder, Warriner, & Miller, 2002). As discussed in the previous chapter, previous research, including some that has focused specifically on college students, has demonstrated that age (Brown and Bishop, 1982; Groves, Cialdini, & Couper, 1992; Herzog and Rodgers, 1988),

gender (DeMaio 1980; Groves, Cialdini, & Couper, 1992; Smith 1979), and race/ethnicity (Dey, 1997; Porter & Whitcomb, 2005) all affect one's predilection to participate in self-administered surveys.

Internet access and use data. Although the BCSSE survey instrument included questions related to most of the personal characteristics linked to survey non-response, it did not ask about previous Internet access and use experiences, the central focus of this study. Although there are many other surveys and studies that explored students' present Internet access and use, both national (e.g. Pew Internet & American Life Project, 2009; Smith, S. D., Salaway, G., & Caruso, 2009) and institutional (e.g. Stanford University, 2009; University of Virginia, 2010), none of these adequately explored previous Internet access and use. Therefore I constructed a new survey instrument to collect these data.

Instrument development. It would be very convenient if Internet access and use could be measured with a single variable (i.e., a single continuous latent construct would underlie this instrument and its questions). However, it is more complicated because there are several related but distinct ideas underlying Internet access and use. These ideas include: frequency, openness (i.e. filtered or unfiltered), supervision, ownership, and location. These are derived largely from qualitative work that has been conducted over the past five years, work that has explored how young people access and use the Internet (Ito et al, 2010, Palfrey & Gasser, 2008, Watkins, 2009, etc); this work was discussed and summarized in Chapter Two.

Although existing surveys of computer ownership and Internet use were not appropriate for this study, they were informative in the construction of this new survey instrument. Most of these instruments were of limited utility in that nearly all focused on present computer ownership and Internet access with few questions focusing on retrospective ownership and access but using those instruments and prior research to inform the creation of this new instrument helps establish

the face validity of the new instrument. Most notable among the resources informing this new instrument are the following multi-year studies:

- ECAR Study of Undergraduate Students and Information Technology surveys (Smith & Caruso, 2010; Smith, Salaway, & Caruso, 2009; Salaway & Caruso, 2008, 2007; Salway, Katz, & Caruso, 2006; Caruso & Kvavik, 2005; Kvavik, Caruso, & Morgan, 2004)
- North Carolina State University ResNet surveys (1998-2009) (North Carolina State University, n.d.)
- Oxford Internet Surveys (2003, 2005, 2007) (University of Oxford, 2010)
- Pew Internet & American Life survey questions (Pew Internet & American Life Project, 2011)
- Stanford University Residential Computing annual surveys (2000-2009) (Stanford University, n.d.)
- U.S. Bureau of Labor Statistics and Bureau of the Census Internet and computer use questionnaires (1994, 1997, 1998, 2000, 2001, 2003) (U.S. Census Bureau, n.d.)

The 2010 U.S.IMPACT Study (Becker et al.) also deserves particular mention as a study that specifically focused on where, how, and why respondents accessed the Internet during the past 12 months. The web survey instrument employed by these researchers was particularly informative as it is relatively recent and deals with issues that are only now becoming an issue for researchers in this field. For example, the wording they used to describe mobile devices ("a handheld mobile device like a cell phone, Blackberry, or iPhone," Appendix 5, p. 2) was very instructive. The thorough process employed by Becker el al. to develop their instrument (described in Appendix 1 in their final report) made their study particularly informative and

useful for this dissertation. Just as they linked several different theoretical frameworks and models to explore how the U.S. public benefits from Internet access at U.S. libraries, this study links sociotechnical ideas related to Internet access and use – the digital divide and participation gap – with a framework for web survey participation.

Instrument quality. The quality of a survey instrument is often described using two broad properties, validity and reliability, inherited from the psychologists who were influential in the development and formalization of survey methodology in the first half of the 20th century (O'Muircheartaigh, 1997). A valid instrument measures what it is intended to measure. Validity is gauged using several methods, many of them subjective in nature and based on the judgment of experts and interactions with and observations of persons taking the survey. A reliable instrument is one that is internally consistent and produces the same or very similar results if administered multiple times. Although our understanding of survey quality has advanced beyond the reassuringly simple and scientific-sounding ideas of reliability and validity, advancements that are demonstrated in the discussions of Total Survey Error and the Tailored Design Method in the previous chapter, these concepts remain useful when assessed with multiple measures (Groves, 2004). This section describes some of the indicators of validity and reliability associated with this instrument and the next chapter will present additional empirical evidence using data collected with the instrument.

Validity. The Internet Access and Use instrument appears to be valid based on (a) its solid grounding in empirical research and favorable comparisons with similar instruments, (b) positive reception by content and method experts, and (c) positive reception during pilot testing and cognitive interviews.

The first of these validity indicators – solid grounding in empirical research and favorable comparisons with similar instruments – has already been described in great detail both in this

chapter and the previous chapter. These indicators are evidence that this instrument possesses construct validity (Groves et al, 2009).

The second indicator of validity – positive reception by content and method experts – is commonly labeled face validity. To establish the face validity of this instrument, drafts of the instrument were sent to several experts. Three content experts with expertise in college student technology support were consulted:

- Carol Anderer, Associate Director of Client Support & Services, University of Delaware
- Jan Gerenstein, Associate Director of Residential Technology, Northern Illinois University
- Rich Horowitz, Director of Academic Computing Services, Stanford University

Additionally, five researchers with expertise in survey design and analysis of survey data were consulted:

- Dr. Jim Cole, BCSSE Project Manager, Center for Postsecondary Research (CPR), Indiana University
- Dr. Robert Gonyea, Associate Director, CPR, Indiana University
- Dr. Ali Korkmaz, Associate Research Scientist, CPR, Indiana University
- Dr. Amber Lambert, Assistant Research Scientist, CPR, Indiana University
- Dr. Thomas Nelson Laird, Faculty Survey of Student Engagement (FSSE) Principal Investigator, CPR, and Associate Professor, Indiana University

Staff in Indiana University's Center for Survey Research (CSR) also reviewed the instrument as part of their regular processes in finalizing its format prior to administration. In particular, Nancy Barrister, CSR Associate Director, and Dr. John Kennedy, CSR Director, reviewed the instrument and offered constructive feedback. The instrument was favorably

received by each of these experts and their feedback used to improve it. For example, one reviewer was quite outspoken in encouraging the addition of a question addressing mobile Internet use, an issue that was initially given little consideration; this oversight was corrected and the final instrument included a question specifically focused on mobile use and the response options for another question were adjusted to include mobile devices.

The third indicator of validity – positive reception during pilot testing and cognitive interviews – proved to be the most challenging and is the indicator most in need of additional work should this instrument be used in future studies. Despite financial incentives and considerable effort to pilot the instrument and conduct cognitive interviews with undergraduate students at Indiana University-Bloomington, very few students participated. Although the number of participants was very small – 16 students in the pilot and 1 student in the cognitive interviews – the results were encouraging as there was low variance among the respondents. This is encouraging because this group included students of all classes and I expect students become homogenous on their responses to this instrument as they spend more time in college and have the same or similar Internet access and use resources. These encouraging results, coupled with (a) the positive reception by content and process experts and (b) the inflexible timeline associated with a large survey administered at over one hundred institutions over the course of several months, pressed the study forward without additional pilot testing.

Reliability. The incomplete assessment of the reliability of this new instrument is a limitation that will be fully addressed in Chapter Five as the pilot did not yield sufficient data to exhaustively evaluate reliability. In particular, assessing the reliability of this instrument would require tests and retests to determine if respondents respond similarly each time they complete the instrument, a time and resource-intensive effort not sufficiently undertaken prior to fielding this instrument.

For many instruments, including the NSSE and BCSSE, reliability is established by examining how the different questions measuring each latent construct relate to one another using statistical measures such as Cronbach's alpha and inter-item correlation (e.g., National Survey of Student Engagement, 2011f). That is not a viable approach for this instrument as it is not yet established if it measures a single underlying latent construct; in fact, it is theorized that it is collecting information about multiple related but distinct latent constructs. However, there are some questions whose content significantly overlaps and responses should be similar and the responses to those questions will be compared in the next chapter.

Population and Sample

This study focused on the population of incoming first-year students at eight U.S. colleges and universities that participated in the (a) Paper mode of BCSSE in the summer or fall of 2010 and (b) Web-only mode of NSSE in the spring of 2011. The sample was a convenience sample consisting of first-year students who participated in BCSEE in 2010 at those institutions. Figure 3.1 illustrates the population and how the criteria of this study and resources available determined the convenience sample.

The eight institutions whose students are in this sample are relatively diverse given the small sample size. These institutions mostly award only bachelor's degrees (five institutions) with the remainder awarding bachelor's and Master's degrees (three institutions). Private institutions are over-represented in this sample as only one of the eight institutions is publicly-governed. In terms of enrollment, two of these institutions are classified by the Carnegie Foundation for the Advancement of Teaching as Very small, three are Small, two are Medium, and one is not classified (it is a "Special focus institution"). With respect to the proportion of students who live on campus, four institutions are highly-residential, two are primarily-residential, one is primarily non-residential, and one is not classified. Geographically, all four of

the major geographic areas defined by the U.S. Census are represented in this sample: three institutions are in the Northeast, three institutions are in the South, one institution is in the Midwest, and one institution is in the West. These institution-level sample characteristics are summarized in Table 3.1.

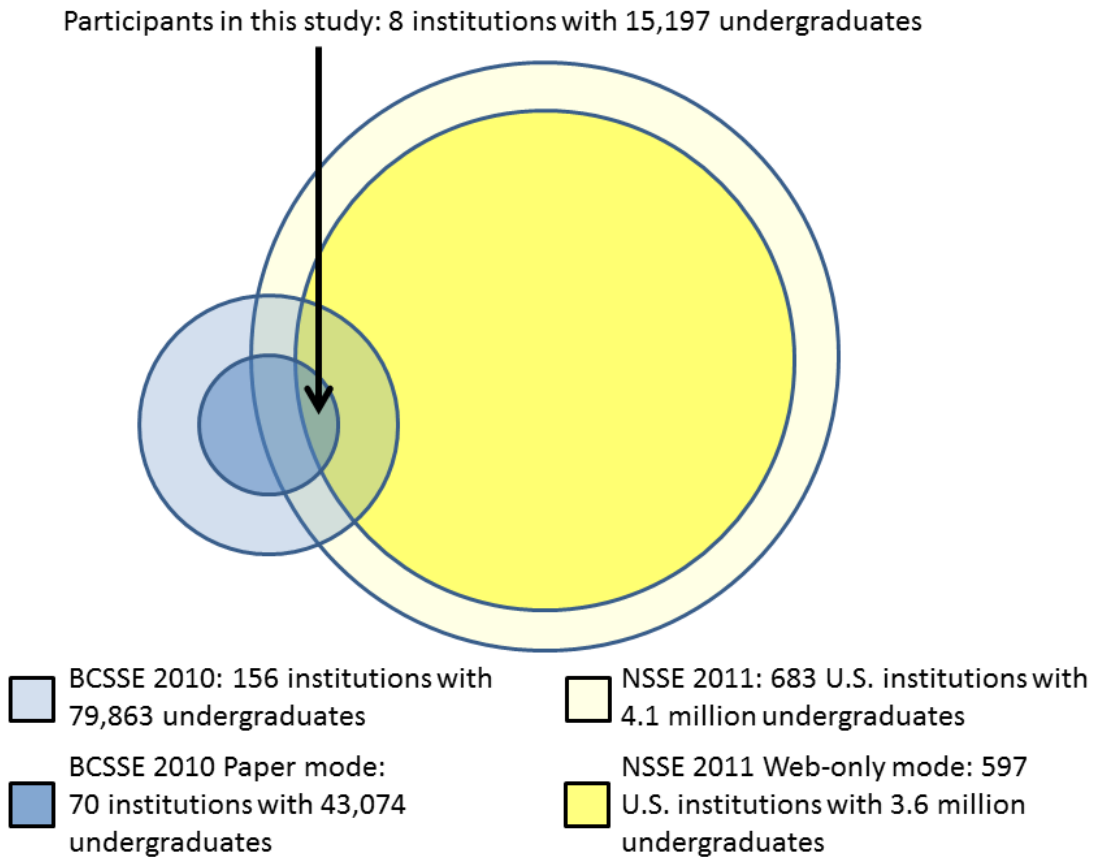

Figure 3.1. The study population.

At the student level, these eight institutions had 3,707 eligible first-year students in their NSSE 2011 population file; this is the total study population. The sample, however, consists of

the 2,523 students at those institutions who also participated in BCSSE 2010. These students were identified by the participating institutions when they supplied the unique identifying

Table 3.1.

Institution-level Sample Characteristics.

Characteristic		Number of institutions
Governance	Public	1
	Private	7
(Simplified) Carnegie Basic Classification	Bachelor's	5
	Master's	3
Size	Very small	2
	Small	3
	Medium	2
	Not classified	1
Setting	Highly-residential	4
	Primarily-residential	2
	Not classified	1
Geographic location	Northeast	3
	South	3
	Midwest	1
	West	1

number of the BCSSE survey completed by each student. This unique number was included in each of the three data files used in this study and was the key in linking the three datasets. This approach may omit students who participated in BCSSE and were invited to participate in NSSE by their college or university; not only is this the most conservative approach since these students cannot be counted as non-respondents but it is also the only viable approach since critical information about those students from BCSSE is unavailable because I lack the necessary information to link their BCSSE and NSSE responses. Table 3.2 summarizes student-level characteristics of the study sample, including an indication of the percentage of students from the

population who were included in the sample. Note that for some small groups there were more students in the sample than reported in the population; in addition to being controversial with some people and subject to malicious misreporting, questions about race and ethnicity are self-reported characteristics that (a) can and do change over time and (b) are sometimes contextual and reported differently by people depending on the situation and circumstance (e.g., people in different developmental stages of racial or ethnic identity).

Table 3.2.

Student-level Population and Sample Characteristics.

		Population (NSSE)		Sample (NSSE & BCSSE)	
		Frequency	Percentage	Frequency	Percentage
Gender	Men	1577	43%	996	39%
	Women	2130	57%	1509	60%
	Unknown	0	0%	18	1%
Race/ethnicity	African American/Black	1014	27%	593	24%
	American Indian/Alaska Native	8	0%	18	1%
	Asian/Pacific Islander	147	4%	91	4%
	Hispanic/Latino	153	4%	79	3%
	Multi-racial	54	1%	96	4%
	Other	45	1%	39	2%
	Unknown	582	16%	108	4%
	White/Caucasian	1705	46%	1499	59%
First-generation status	First-gen	unknown	unknown	693	27%
	Non-first-gen	unknown	unknown	1733	69%
Total		3707		2523	

Two important demographic characteristics used in this study were not collected for the entire population but only for the sample: Status as a first-generation college student (a proxy for SES) and age. These data are not provided in the NSSE population file but were only collected on the BCSSE and NSSE survey instruments. In the study sample, 693 students (27%) were classified as being first-generation students; these were students who indicated in BCSSE that they did not have a parent with a four-year degree.

Non-Response Bias

The data described in previous sections – survey response/non-response and descriptive information about the participants – were collected to determine if student' previous experiences accessing and using the Internet affect their predilection to respond to the Web version of NSSE. Specifically, the data were collected to determine if variables related to Internet access and use affect survey response after controlling for other common predictors of non-response.

To avoid introducing error, missing data were not imputed in this study; students for whom data are missing whether because they did not reply to one or more survey questions – item non-response – or because their institution did not provide data were necessarily omitted from analyses that include that data. The number of students omitted from each analysis is reported when the specific analysis is presented and discussed in the following chapters.

Data analysis. The non-response bias analysis in this study closely followed the model of non-response detection and analysis outlined by Bethlehem, Cobben, and Schouten (2011). Before examining non-response bias, I first classified respondents into a small number of discrete groups using their responses to the Internet Access and Use survey. I then used bivariate tests of independence to explore possible relationships between (a) auxiliary variables and response and (b) auxiliary variables and target variables (respondent scores on the NSSE

benchmarks). Finally, I explored the relationships among all of the auxiliary variables and response using logistic regression. All analyses were performed using IBM SPSS Advanced Statistics 20.0 software.

Cluster analysis. Before examining these data for evidence of a non-response bias, "Internet access and use" must be operationalized using the data collected. More specifically, one or more new variables must be created that effectively summarize or encapsulate Internet access and use using the responses to the survey questions, a process broadly known as "data reduction."

As demonstrated by the literature in Chapter Two, past Internet access and use experience is not a unidimensional construct and I did not assume that the variables in the Internet access and use survey instrument were independent so cluster analysis was the most appropriate way to classify these respondents into groups with similar responses. I specifically used k-means clustering in this study, a data reduction method that groups cases together based on their distance from a mean or center value of the specified variables (Hartigan, 1975). Formally, this is an iterative partitioning method using Euclidean distance similarity measure. Although the number of clusters is specified prior to running the analysis, the specific clusters to which cases are assigned and the center values of the clusters are iteratively modified by the algorithm until they are stable. It was up to me to interpret the values and the meanings of the clusters although the center values of the clusters may be helpful in doing so (Aldenderfer & Blashfield, 1984; Norušis, 2010). By interpreting the clusters and comparing them to expected results based on extant research, I determined the set of clusters for which I could make the strongest argument for validity. I then proceeded to test the stability of the clusters by randomly dividing the data set into two halves and running the same clustering algorithm on each half to determine if they

both exhibited the same structure as in the original run with the entire data set (Clatworthy, Buick, Hankins, Weinman, & Horne, 2005).

Bivariate tests of independence. Only if there was a link between the demographic variables used in this study and the NSSE benchmarks could there exist the possibility of non-response bias linked to those demographic variables. Although I could not examine the relationship between these demographic variables and the NSSE benchmarks for all of the students in my population, I could do that for the respondents. The relationship between the demographic variables and response was explored using Cramer's V, a nonparametric test that does not require the variables to have a known distribution (Agresti, 2002). Similarly, I used Spearman's rho to explore the relationship between the NSSE benchmarks and the demographic variables in this study because it is an appropriate nonparametric test for examining the relationship between a categorical variable and a continuous variable.

Logistic regression. After exploring possible bivariate relationships among the variables used in this study, I used logistic regression to examine the relationship between survey response and other student and institutional characteristics. Logistic regression, a multivariate method used to explore the relationship between several independent variables and a dependent variable, is often employed to analyze nonresponse bias because survey response, the dependent variable, is a binary variable (e.g. Korkmaz, & Gonyea, 2008; Moore & Tarnai, 2002; Porter & Umbach, 2005). Following the model of Bethlehem, Cobben, and Schouten (2011), I entered each of the demographic variables stepwise into the logistic regression model using the results of the bivariate analyses to determine the order in which the variables are entered. The variables with the strongest association with response were entered first. By creating models and entering variables in this manner, I was able to determine when the variables cease having a meaningful

impact on the dependent variable. Table 3.3 summarizes the independent variables in these models.

Table 3.3.

Independent Variables.

Data	Source	Block entered into model
Gender	BCSSE	2
Race/ethnicity	BCSSE	3
Socioeconomic status (proxy: first-generation student status)	BCSSE	5
Institution	n/a	1
Internet access and use	New instrument distributed with BCSSE	4

Gender was operationalized as a dichotomous variable. There are eight race/ethnicity categories (American Indian, Asian American, Black, Hispanic/Latino, White, Multiracial, Other, and Unknown) and I combined some categories to make analysis and interpretation more feasible given my sample size and the number of students in each race/ethnicity category. White students make up the majority of the sample so that group was retained. As discussed in Chapter Two, there are significant differences among Black and Hispanic/Latino people in terms of Internet access and use so those groups were also retained as distinct groups. Therefore race/ethnicity was included in the model as a set of three dummy variables – White, Black, Hispanic/Latino, and Other – with White as the control since it is the largest category. Socioeconomic status was included in the model using first-generation student status as a dichotomous proxy measure. Institution, the college or university each student attended, was included as a series of dummy variables. Finally, Internet access and use was included as described in the following chapter.

The dependent variable in this model is, of course, whether a student responded to the NSSE survey. As previously described, for NSSE these are students who answered at least one question in the main body of the survey and at least one demographic question; in practice, this captures students who answered most or all of the questions in the survey. This group of students will be discussed in great detail in the next chapter.

Summary

This chapter has described how the data for this study were collected and analyzed. Demographic data from BCSSE, including a newly-developed Internet Access and Use instrument, were combined with population and response data from NSSE. Relationships between these variables were explored using bivariate tests of independence. These data were used to create logistic regression models with the demographic data and institutional data used as independent variables and survey response used as the dependent variable. These relationships between these variables and the models constructed using them are described in detail in the next chapter and their implications explored in the final chapter.

Chapter Four: Results

In this chapter, I present the results of this study leaving detailed analysis and synthesis for Chapter Five. This study has two research questions so this chapter has two sections with relevant data related in each respective section. As a reminder, those research questions are:

RQ1: What are the different patterns of Internet-connected computer ownership, access, and use within a sample of undergraduate students at U.S. institutions of higher education?

RQ2: Does this Web-based survey exhibit a significant non-response bias based on students' previous computer ownership, access, and use experiences?

Table 4.1.

Abbreviations for Question 1: During the last 12 months....

Question	Abbreviated question
a. How often did you use a computer (desktop, laptop, notebook, tablet, etc.) to access the Internet?	a. Overall Internet use
b. On a typical day, for how many hours each day did you use a computer (desktop, laptop, notebook, tablet, to access the Internet?	b. Daily Internet use
c. On the computer you use most often to access the Internet, could you connect to all websites, (i.e. was the Internet connection censored or filtered)?	c. Filtered
d. When you connected to the Internet on the computer you used most often, were you supervised by parents, teachers, librarians, or others?	d. Monitored
e. Did you or your family own the computer you used most often to connect to the Internet?	e. Own computer
f. Did you regularly use multiple computers (your computer, school's computer, library's computer, etc.) to access the Internet?	f. Multiple computers
g. How often did you use a handheld mobile device (cell phone, Blackberry, iPhone, etc.) to access the Internet?	g. Handheld mobile device
h. Did you regularly use something other than a computer or mobile device (game console, e-book reader, etc.) to access the Internet?	h. Other device

To make results more readable, I will label and abbreviate each question in the Internet Access and Use survey throughout this chapter and the next as shown in Tables 4.1 and 4.2.

Classification of Students

The first research question asks if there are different patterns of Internet-connected computer ownership, access, and use within this sample of undergraduate students. Another way of stating this question is to ask if the survey instrument created for this study differentiates between the respondents in meaningful ways. This question also implicitly tests the validity of the instrument as the responses to the Internet Access and Use survey and the categories created using those responses should largely align with other research in this area. To improve the analysis and increase the sample size for this research question, I added survey responses from 435 students who participated in BCSSE but were not included in the NSSE population because they departed the institution (or because there was a mistake somewhere along the line in the administration of these two surveys that made it impossible to match the two sets of survey responses).

Response frequencies and instrument quality.

Tables 4.3 and 4.4 display the frequencies with which students responded to each question. Table 4.5 displays similar results with descriptive statistics for Question 1 coded numerically; the "I do not know" responses in subquestions c and d were omitted for these and subsequent numerical calculations. As shown in these tables, students responded differently to each question – formally stated as there is variance in the sample – so next I examined several questions in more detail to determine if there were differences between subpopulations as an indicator of instrument validity.

Table 4.2.

Abbreviations for Question 2: How will you access the Internet on a regular basis during your next year in college? (Select all that apply.)

Response options	Abbreviated response option
a. I will use my own computer	a. Use own computer
b. I will use my family's computer	b. Use family computer
c. I will use someone else's (friend, roommate, etc.) computer	c. Use another's computer
d. I will use computers on campus (computer labs, library, etc.)	d. Use campus computers
e. I will use something other than a computer (cell phone, game console, etc.)	e. Use something else
f. I will not access the Internet	f. Use nothing
g. I do not know	g. Use unknown

Table 4.3.

Frequencies of Response Options for Question 1: During the last 12 months....

Question	Response options	Frequency	Percent
a. Overall Internet use	Less often or never	9	0.3%
	Every few weeks	9	0.3%
	1-2 days a week	48	1.6%
	3-5 days a week	191	6.5%
	About once a day	514	17.4%
	Several times a day	2152	72.8%
	No response	35	1.2%
	Total	2958	100.0%
b. Daily Internet use	Less than 1 hour	166	5.6%
	1 to 2 hours	667	22.5%
	2 to 3 hours	688	23.3%
	3 to 4 hours	495	16.7%
	4 to 5 hours	356	12.0%
	5 to 6 hours	238	8.0%
	6 to 7 hours	106	3.6%
	7 hours or more	202	6.8%
	No response	40	1.4%
	Total	2958	100.0%

Question	Response options	Frequency	Percent
c. Filtered	I did not use a computer to access the Internet at all	8	0.3%
	No, I could only connect to a few websites	49	1.7%
	No, but I could connect to most websites	468	15.8%
	Yes, but I could connect to all websites	2092	70.7%
	I do not know	288	9.7%
	No response	53	1.8%
	Total	2958	100.0%
d. Monitored	I did not use a computer to access the Internet at all	5	0.2%
	Yes, I was always supervised	42	1.4%
	Yes, I was sometimes supervised	684	23.1%
	No, I was always unsupervised	2117	71.6%
	I do not know	65	2.2%
	No response	45	1.5%
	Total	2958	100.0%
e. Own computer	I did not use a computer to access the Internet at all	4	0.1%
	No, the computer did not belong to me or my family	98	3.3%
	Yes, the computer belonged to my family	1162	39.3%
	Yes, the computer belonged just to me	1647	55.7%
	No response	47	1.6%
	Total	2958	100.0%
f. Multiple computers	I did not use a computer to access the Internet at all	8	0.3%
	No, I only used one computer	869	29.4%
	Yes, I used multiple computers	2030	68.6%
	No response	51	1.7%
	Total	2958	100.0%
g. Handheld mobile device	Never	771	26.1%
	Several times a month	101	3.4%
	Once or twice a week	125	4.2%
	Several times a week	112	3.8%
	Once or twice a day	310	10.5%
	Several times a day	1494	50.5%
	No response	45	1.5%
	Total	2958	100.0%

Question	Response options	Frequency	Percent
h. Other device	I did not access the Internet at all	50	1.7%
	No, I only accessed the Internet using a computer or mobile device	2018	68.2%
	Yes, I accessed the Internet using other devices	836	28.3%
	No response	54	1.8%
	Total	2958	100.0%

Table 4.4.

Frequencies of Response Options for Question 2: How will you access the Internet on a regular basis during your next year in college? (Select all that apply.)

Response options	Response	Frequency	Percent
a. Use own computer	Selected	2779	93.9%
	Not selected	179	6.1%
	Total	2958	100.0%
b. Use family computer	Selected	160	5.4%
	Not selected	2798	94.6%
	Total	2958	100.0%
c. Use another's computer	Selected	168	5.7%
	Not selected	2790	94.3%
	Total	2958	100.0%
d. Use campus computers	Selected	750	25.4%
	Not selected	2208	74.6%
	Total	2958	100.0%
e. Use something else	Selected	453	15.3%
	Not selected	2505	84.7%
	Total	2958	100.0%
f. Use nothing	Selected	1	0.0%
	Not selected	2957	100.0%
	Total	2958	100.0%
g. Use unknown	Selected	37	1.3%
	Not selected	2921	98.7%
	Total	2958	100.0%

Table 4.5.

Descriptive Statistics for Question 1: During the last 12 months....

Question	N	Minimum	Maximum	Mean	Std. Deviation
a. Overall Internet use	2923	1	6	5.6	0.8
b. Daily Internet use	2918	1	8	3.8	1.9
c. Filtered	2617	1	4	3.8	0.5
d. Monitored	2848	1	4	3.7	0.5
e. Own computer	2911	1	4	3.5	0.6
f. Multiple computers	2907	1	3	2.7	0.5
g. Handheld mobile device	2913	1	6	4.2	2.2
h. Other device	2904	1	3	2.3	0.5

Instrument validity. In the previous two chapters, I described several differences among groups of people in terms of Internet access and use in the United States and these differences should be replicated in these results. To summarize those differences, I expected Internet access and use to be more common among younger people, people in urban locations, people who are employed full-time, people with more education, and White people. I did not know where these respondents lived or whether they or their parents were employed and there was very little variance in their ages so I did not examine those variables. I also presumed that there was little variance in the education levels of these respondents given that they were all first-year undergraduate students. I used first-generation status as a proxy for socioeconomic status and the students each provided their race and ethnicity so those were both viable areas of exploration. I also examined whether there were differences between male and female respondents as the literature indicates that there are no systematic differences between people of different genders in their access to and use of the Internet.

This analysis used independent samples t-tests to examine differences among subpopulations in terms of gender and first generation status in their responses to Question 1 on

the Internet Access and Use instrument. There were more than two groups for race/ethnicity so I employed ANOVA for those comparisons. In this study, Question 2 was primarily used for reliability purposes and is omitted in this analysis of differences among subpopulations because it required students to predict future access and usage instead of focusing how respondents accessed and used the Internet during the previous year.

The "I do not know" responses for Question 1c and 1d are included in the frequency tables but were not included in statistical calculations. The other response options can be reasonably interpreted as ordinal and thus I was able to obtain some information by performing calculations with them as if they were scalar but the "I do not know" responses do not fit this schema. For Question 1c this omits 9.7% of the responses and for Question 1d this omits 2.2% of the responses.

Differences between genders. Response frequencies, descriptive statistics, and independent samples t-test results for responses to Question 1 of male and female respondents are in Appendix D. As shown in that appendix, there were two parts of Question 1 where independent sample t-tests showed significant differences between male and female respondents; descriptive statistics for those responses are in Table 4.6. These data show that among these respondents more men accessed the Internet using multiple computers and more men accessed the Internet using a device other than a computer or smartphone.

Differences between races/ethnicities. Although response frequencies for each racial/ethnic group are shown in Appendix E, some of the racial/ethnic groups were too small in this group of respondents to enable meaningful statistical comparisons between them. While it may be distasteful from a sociological perspective, I had to combine some of these groups to perform useful statistical comparisons. There are a substantial number of White and Black

respondents so those groups were retained. Although it is a smaller group, the literature (e.g., U.S. Census Bureau, 2009b, 2009c) suggests that Hispanic/Latino respondents may show some important differences from other racial/ethnic groups so those respondents were also kept in a distinct group. The remaining groups – American Indian, Asian American, Multiracial, and students who provided no response – were collapsed into one group. This yielded the four groups described in Table 4.7.

Table 4.6.

Descriptive Statistics of Question 1 Where Male and Female Respondents Significantly Differed.

Question	Gender	N	Mean	Std. Deviation	Std. Error Mean
f. Multiple computers	Male	1164	2.73	0.45	0.01
	Female	1724	2.67	0.47	0.01
h. Other device	Male	1161	2.40	0.53	0.02
	Female	1724	2.18	0.43	0.01

Table 4.7.

Combined Racial/Ethnic Groups for Statistical Comparisons.

New grouping	Old grouping(s)	N
White	White	1731
Black	Black	693
Hispanic/Latino	Hispanic/Latino	105
Other	American Indian, Asian American, Multiracial, Other/no answer	429

Descriptive statistics for responses to Question 1 for these combined racial/ethnic groups are shown in Appendix F. I used a one-way ANOVA to determine if there were statistically significant differences with those results reported in Table 4.8. As noted in Table 4.8, responses for several of the questions had substantially different variances among the different groups of

respondents. ANOVA assumes that groups have similar variances – homogeneity of variance or homoscedasticity – but alternative F-tests can be performed that correct for this violation if the assumption of independence holds (Welch, 1951). Results of Levene's Test of Homogeneity of Variances are not reported here but when they indicated that the homoscedasticity assumption was violated I report Welch's F to correct that violation.

Table 4.8.

ANOVA Comparisons of Question 1 for Combined Racial/Ethnic Groups.

Question	df (Between Groups)	df (Within Groups)	F	Sig.
a. Overall Internet use	3.00	419.914	0.987*	0.40
b. Daily Internet use	3.00	420.419	79.797*	0.00
c. Filtered	3.00	2613	0.568	0.64
d. Monitored	3.00	418.135	4.589*	0.00
e. Own computer	3.00	429.96	3.497*	0.02
f. Multiple computers	3.00	2903	0.436	0.73
g. Handheld mobile device	3.00	433.076	77.777*	0.00
h. Other device	3.00	414.604	9.071*	0.00

* Welch's F reported because assumption of homoscedasticity was violated

Table 4.8 indicates that there were significant differences between some of these groups for most of these questions. I used Tukey's post-hoc test to determine which of these groups were similar and which ones were different. The complete results are too cumbersome and lengthy to report but they can be summarized as follows:

a. Overall Internet use: No significant differences.

b. Daily Internet use: White respondents reported the lowest average hours of daily Internet usage with a computer. Black students reported using a computer to access the Internet for more hours each day than the other three racial/ethnic groups.

c. Filtered: No significant differences.

d. Monitored: White respondents reported a significantly lower mean for this question compared to Black respondents indicating that more White respondents believed that their computer's Internet connection was filtered or restricted in some way.

e. Own computer: Although the ANOVA indicated significant differences Tukey's post-hoc test found all four groups to have similar means.

f. Multiple computers: No significant differences.

g. Handheld mobile device: White students reported significantly less usage of handheld mobile devices than the other three groups of students. Black students reported more usage of these devices than the other three racial/ethnic groups.

h. Other device: White students reported significantly less usage of other devices than Hispanic/Latino students.

Differences between first-generation and non-first-generation students. Response frequencies, descriptive statistics, and the results of independent sample t-tests comparing responses to Question 1 of first-generation student and non-first-generation student respondents are in Appendix H. In these eight questions there are three where paired sample t-tests showed significant differences between first-generation and non-first-generation respondents; descriptive statistics for those responses are in Table 4.9. On the whole, first-generation students accessed the Internet more often but non-first-generation students used the Internet longer each day and were more likely to use a handheld mobile device to access the Internet.

Table 4.9.

Descriptive Statistics of Question 1 Where First-gen and Non-first-gen Respondents Significantly Differed.

Question	First-gen status	N	Mean	Std. Deviation	Std. Error Mean
a. Overall Internet use	First-gen	1967	5.67	0.68	0.02
	Non-first-gen	838	5.52	0.87	0.03
b. Daily Internet use	First-gen	1963	3.73	1.81	0.04
	Non-first-gen	837	3.92	1.97	0.07
g. Handheld mobile device	First-gen	1961	4.11	2.18	0.05
	Non-first-gen	835	4.43	2.11	0.07

Instrument reliability. As described in Chapter Three, an accessible indicator of instrument reliability is to examine responses to questions that should elicit similar or identical responses. In particular, I expected the following:

- Respondents who indicated that they did not use a computer to access the Internet at all to one question should have responded similarly to all four questions that allow that response option.
- Respondents who indicated that they primarily used their own computer to access the Internet should have indicated that they plan to access the Internet using their own computer during their first year in college. The underlying assumption is that students who had their own computer during the year prior to matriculating to college will continue using their own computer once in college.
- Respondents who indicated that they used a handheld mobile device or another non-computer device to access the Internet should have indicated that they plan to access the Internet using a non-computer device during their first year in college. The underlying assumptions are that students who used a handheld mobile device

during the year prior to matriculating to college (a) owned their own device and (b) will continue using that device or one that replaces it and remains their own.

Each of these assumptions was tested and results are summarized below. As with all results in this chapter, detailed analysis and interpretation will be deferred until the following chapter. These results will be discussed not only as part of the answer to the first research question but also in the limitations section of Chapter Five.

Possible non-computer users. As shown in Table 4.3, only a fraction of a percentage of respondents replied to Questions 1c, 1d, 1e, and 1f that they had not used a computer to access the Internet at all. None of those respondents consistently provided that response for all four questions. This is a negative indicator of instrument reliability but it is tempered by the fact that very few students (4-9 respondents, .1% - .3%) provided this response for each question.

Computer owners. Over half – 55.7% – of all respondents replied to Question 1e that they primarily used their own computer to access the Internet. Question 2a asked if respondents planned to use their own computer to access the Internet during their first year of college. Nearly all – 98.3% – of those respondents who indicated that they had primarily used their own computer to access the Internet during the previous year also indicated that they planned to use their own computer to access the Internet during their first year of college. This is a largely positive indicator of reliability.

Mobile device users. Questions 1g and 1h allowed respondents to indicate if they had used a handheld mobile device or some other non-computer device to access the Internet. Of the 2,142 respondents who indicated that they had used a handheld mobile device to access the Internet, only 416 (19.4%) of them also indicated in Question 2 that they would use a non-computer device to access the Internet during their first year of college. Of the 836 respondents

who indicated that they had used something other than a computer or mobile device (game console, e-book reader, etc.) to access the Internet, only 176 (21.1%) also indicated that they would use a non-computer device to access the Internet during their first year of college. This is a negative finding for the reliability of this instrument.

Classification of Internet access and use.

I created the Internet Access and Use Survey to classify respondents into meaningful, sensible groups that could be used for further analysis. To create those groups using k-means cluster analysis, I first explored different numbers of clusters to determine how many clusters would be most appropriate. I then examined the stability and validity of the clusters.

Cluster creation. As discussed in Chapter Three, I performed k-means cluster analysis to classify students using responses to Question 1. As the questions used different units of measure, I standardized them to z-scores for the cluster analysis. I performed repeated trials using a non-formal heuristic to determine the number of clusters with the aim of having the fewest number necessary to make further analysis readily interpretable. Cluster analysis that produced four or five clusters was difficult to interpret. Cluster analysis that produced three clusters, however, was readily interpretable so I proceeded with those cluster assignments.

As described in Chapter Three, k-means cluster analysis groups cases together based on their distance from a mean or center value of the specified variables (Hartigan, 1975). Table 4.10 displays the clusters created by the 3-cluster k-means analysis and their final cluster centers standardized as z-scores. Descriptive statistics for the three clusters are included in Appendix H.

Table 4.10.

Final Cluster Centers (Standardized z-scores) of 3-cluster K-means Cluster Analysis.

	Cluster		
Question	1	2	3
a. Overall Internet use	0.341	0.290	-1.908
b. Daily Internet use	0.272	-0.152	-0.717
c. Filtered	0.248	-0.341	-0.384
d. Monitored	0.437	-1.038	0.006
e. Own computer	0.414	-0.516	-0.773
f. Multiple computers	-0.085	0.346	-0.158
g. Handheld mobile device	0.258	-0.428	-0.216
h. Other device	0.196	-0.264	-0.259

These figures led me to label the groups as follows:

1. Group 1: High users. For all but one question, this group had higher means for each part of Question 1 than the other two groups. On average, members of this group used computers and mobile devices more often.
2. Group 2: Computer users. This group had a higher average than Group 3 for four of the six questions that focused on computers and a lower one for the question focused on handheld mobile devices. On average, members of this group used a computer more often than members of Group 3 and used handheld mobile devices less often that members of Group 3.
3. Group 3: Low users. For five of the eight questions, this group had the lowest mean. This label is not perfect, however, as this group had a higher mean than Group 2 for handheld mobile device use (but not much higher; the difference was less than a quarter of a standard deviation).

Cluster validity.

I examined the validity of the clusters by examining cluster membership along the lines of gender, race/ethnicity, and first-generation student status. Table 4.11 shows the number and percentage of each of these groups in each cluster.

Table 4.11.

Demographic Variable Distribution in Clusters.

			High users	Computer users	Low users
Gender	Male	Frequency	648	245	149
		Percentage	62.2%	23.5%	14.3%
	Female	Frequency	888	417	198
		Percentage	59.1%	27.7%	13.2%
	Total	Frequency	1536	662	347
		Percentage	60.4%	26.0%	13.6%
Race/ethnicity	White	Frequency	832	465	199
		Percentage	55.6%	31.1%	13.3%
	Black	Frequency	414	115	90
		Percentage	66.9%	18.6%	14.5%
	Hispanic/Latino	Frequency	54	18	16
		Percentage	61.4%	20.5%	18.2%
	Other	Frequency	250	65	44
		Percentage	69.6%	18.1%	12.3%
	Total	Frequency	1550	663	349
		Percentage	60.5%	25.9%	13.6%
First-gen student	Non-first-gen student	Frequency	1042	485	203
		Percentage	60.2%	28.0%	11.7%
	First-gen student	Frequency	442	158	130
		Percentage	60.5%	21.6%	17.8%
	Total	Frequency	1484	643	333
		Percentage	60.3%	26.1%	13.5%

These are all nominal variables so I performed Chi-Square tests to determine if there were significant differences between the groups. There were no significant differences between

these clusters along the lines of gender, $X^2(2, N=2545) = 5.79$, $p = .055$. There were significant differences between these clusters for students of different race/ethnicity, $X^2(6, N=2562) = 55.15$, $p < .000$, and first-generation students, $X^2(2, N=2460) = 22.02$, $p < .000$. These differences and their implications for the validity of this instrument are discussed in Chapter Five.

Cluster stability.

The final step in this cluster analysis was to test the stability of the clusters. This is akin to the idea of reliability in other quantitative or survey contexts and as described in the previous chapter was tested via a split halves method. I randomly divided the data set into two halves and ran the same clustering algorithm originally run on the entire data set on each half to determine if they both exhibited the same structure as the entire data set (Clatworthy, Buick, Hankins, Weinman, & Horne, 2005). The two halves did exhibit the same structure as shown in the results of these tests in Appendix I.

Detection of Non-Response Bias

The second research question asks if the Web-based version of NSSE used in this study exhibits a significant non-response bias based on students' previous computer ownership, access, and use experiences. Answering this question required the Internet access and use classification developed and validated in answering the first research question. I followed the procedure described by Bethlehem, Cobben, and Schouten (2011) which begins with a bivariate analysis of the auxiliary variables, target variables, and survey response to examine relationships among them. A multivariate analysis using logistic regression follows to examine relationships among all of these variables. Table 4.12 summarizes the auxiliary and target variables.

Table 4.12.

Summary of Auxiliary and Target Variables for Non-Response Bias Analyses.

Variable	Source	Variable type
Gender	BCSSE	Auxiliary
Race/ethnicity	BCSSE	Auxiliary
Socioeconomic status (proxy: first-generation student status)	BCSSE	Auxiliary
Institution	n/a	Auxiliary
Internet access and use	Internet Access and Use survey distributed with BCSSE	Auxiliary
Academic Challenge	NSSE	Target
Active and Collaborative Learning	NSSE	Target
Student-Faculty Interaction	NSSE	Target
Enriching Educational Experiences	NSSE	Target
Supportive Campus Environment	NSSE	Target

Bivariate analysis. The first step in analyzing non-response bias is to explore relationships between (a) auxiliary variables and survey response and (b) auxiliary variables and the target variables. This was done using bivariate tests of independence for each set of variables with appropriate indicators of the strength of the relationship (if any) between the variables.

Relationships between auxiliary variables and survey response. The bivariate relationships between auxiliary variables and survey response were analyzed using Chi-Square tests of independence and Cramer's V, a nonparametric indicator of the strength of the relationship between the variables that does not require variables to have a known distribution (Agresti, 2002). As shown in Table 4.13, significant relationships were found between response status and gender, race/ethnicity, Internet access and use, and institution; only first-generation status was independent of survey response. These results indicate that, proportionately, more women responded than men, more White and Hispanic/Latino students responded than Black and "Other" students, more computer users responded than the other two categories of Internet

access and use, and there was significant variation in the proportion of respondents among colleges and universities. Figures 4.1 – 4.5 illustrate these relationships.

Table 4.13.

Bivariate Relationship Between Auxiliary Variables and Response Status.

Auxiliary variable	df	X^2	*p*	Cramer's V
Gender	1	40.112	< .000	0.127
Race/ethnicity	3	13.116	0.004	0.072
First-generation status	1	0.944	0.331	0.02
Internet access and use	2	7.635	0.022	0.059
Institution	7	97.637	< .000	0.197

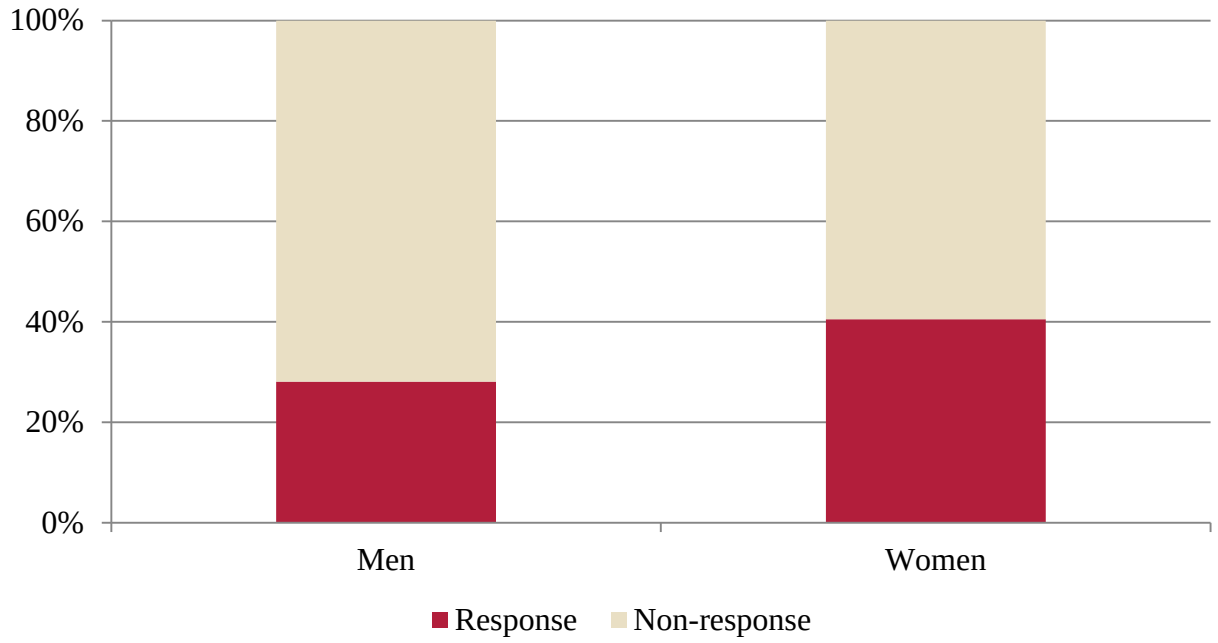

Figure 4.1. Relationship between gender and response status.

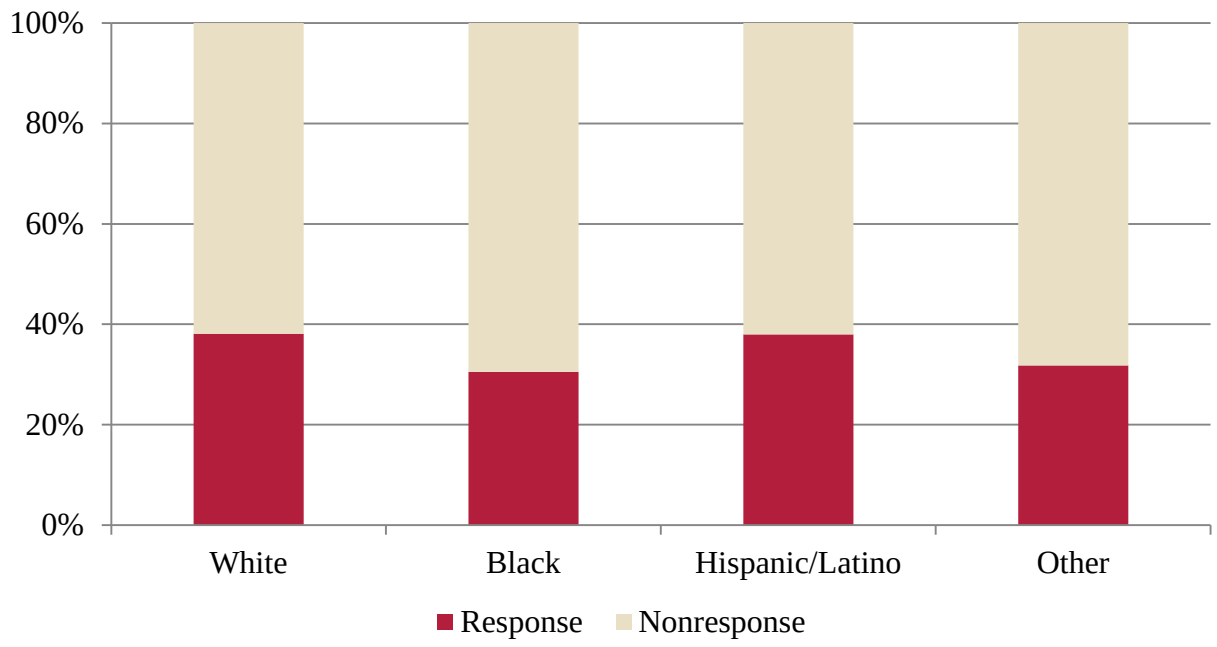

Figure 4.2. Relationship between race/ethnicity and response status.

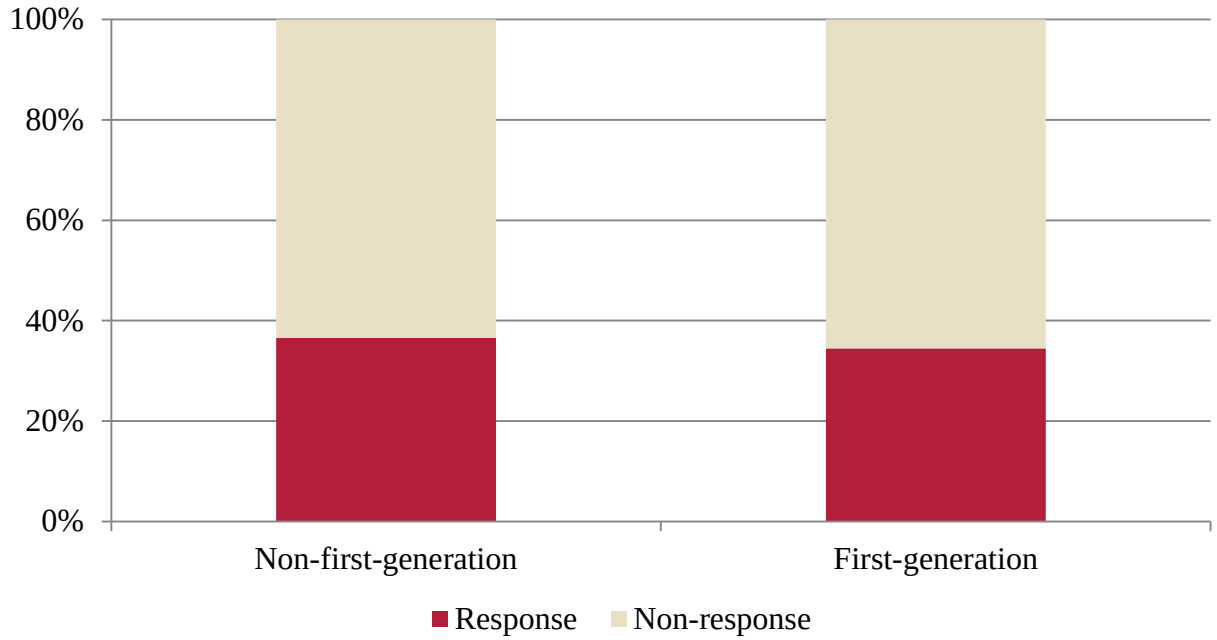

Figure 4.3. Relationship between first-generation status and response status.

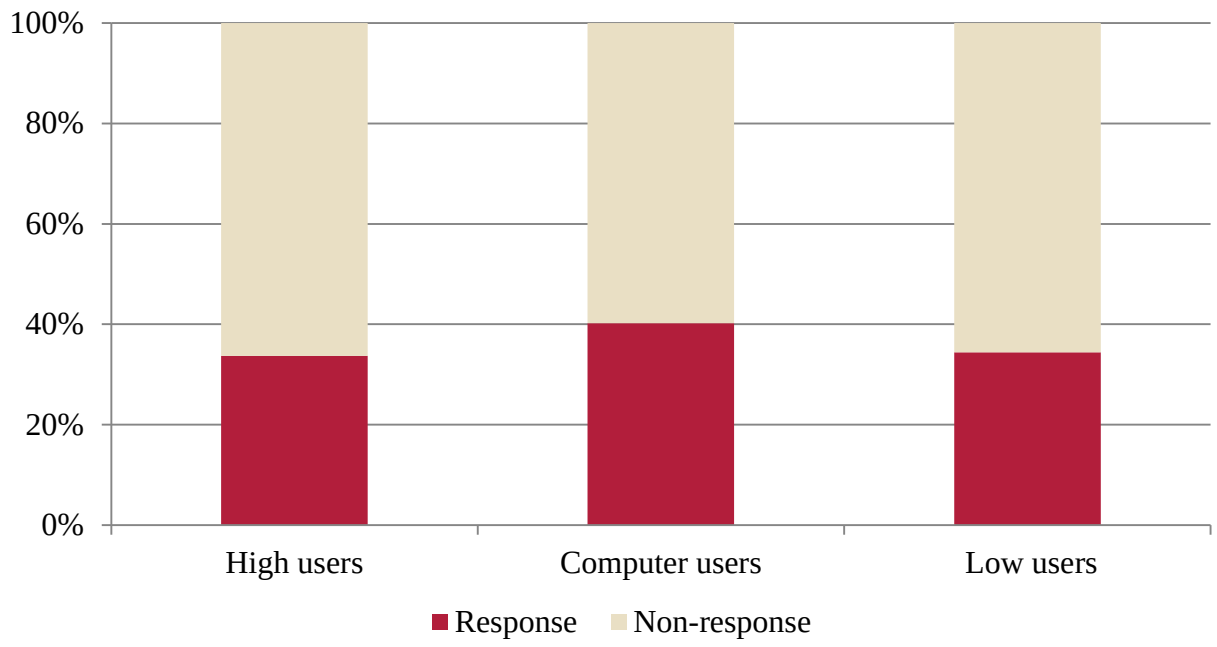

Figure 4.4. Relationship between Internet access and use and response status.

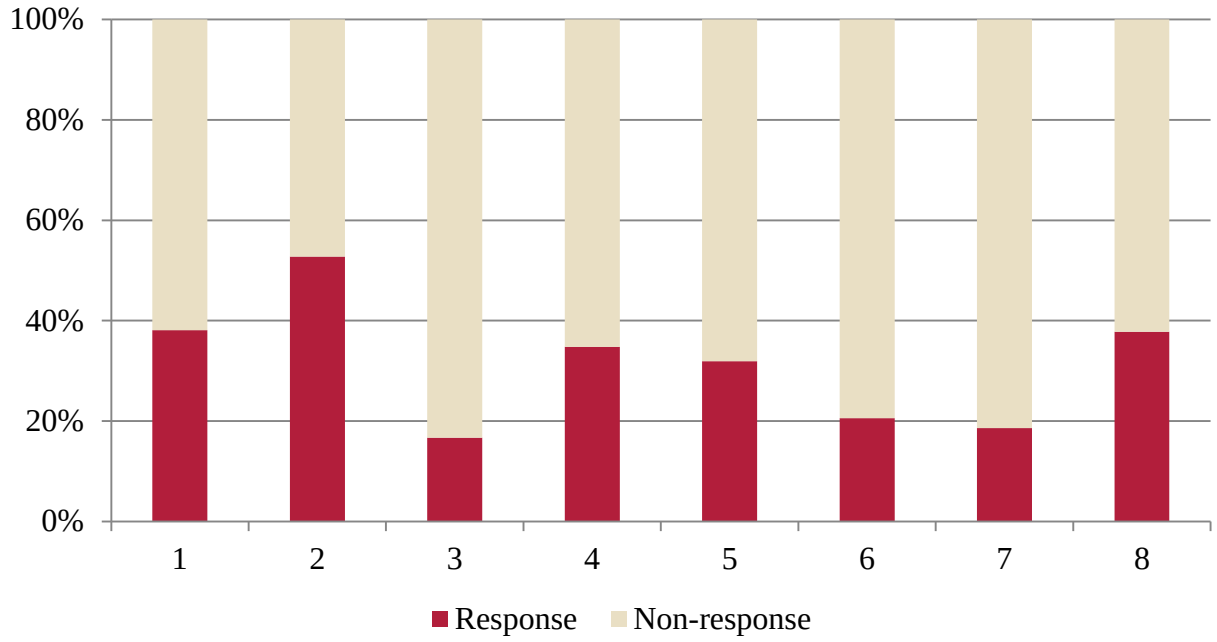

Figure 4.5. Relationship between institution and response status.

Relationships between auxiliary variables and target variables. The bivariate relationships between auxiliary variables and target variables were analyzed using one-way ANOVA tests of independence. Spearman's Rho, a nonparametric indicator of the strength of the relationship between the variables that does not require variables to have a known distribution, was also calculated as it is appropriate for examining the relationship between a categorical variable and a continuous variable. The results are presented in Appendix J.

Relatively few of the one-way ANOVA tests yielded significant results and all of the significant relationships were weak or very weak. None of the tests were significant for gender indicating that it is unlikely that there are differences between men and women in this study's population along the lines of the NSSE benchmarks. These tests determined that there is a significant relationship between race/ethnicity for three benchmarks: Active and Collaborative Learning, Student-Faculty Interaction, and Enriching Educational Experiences; moreover, the Spearman's Rho figures for these three relationships indicate a small relationship in terms of their strength. These tests also determined that there is a significant relationship between first-generation status and two benchmarks, Academic Challenge and Enriching Educational Experiences, but the Spearman's Rho figures were both less than 1 in absolute value indicating very weak relationships in terms of their strength. Internet Access and Use was significantly related to only one benchmark, Enriching Educational Experiences, and the magnitude of the relationship is very weak. For all of the benchmarks except for Supportive Campus Environment, there were significant differences between the different institutions in this study but the magnitude of the relationships are all very weak except for that with Active and Collaborative Learning which is still small.

Multivariate analysis. The second step in analyzing non-response bias is to explore the relationships between all of the auxiliary variables and survey response. This was done using a logistic regression model with the auxiliary variables as independent variables and response status as the dependent variable. Auxiliary variables were entered into the model stepwise with the variable having the strongest relationship with response status (i.e., highest Cramer's V from Table 4.13) entered first and subsequent variables entered in descending order. Tables 4.14 and 4.15 summarize the model.

Although the final model was statistically significant with a *p*-value less than .000, the model has little practical significance since it has a pseudo R^2 value of only .075. The primary variable of interest, Internet access and use, was added in the third step of the model and it contributed very little to the model's practical significance since it only increased the pseudo R^2 value from .072 to .075. Moreover, only gender and the institution variables were significant in this model. The implications of these results will be discussed in further detail in Chapter Five.

Table 4.14.

Multivariate analysis of response behavior.

Variable			Wald X^2		
Institution	72.631	68.298	59.958	61.452	61.469
Gender		25.513	25.150	23.748	23.227
Race/ethnicity			6.640	5.677	5.562
Internet access and use				5.504	5.604
First-generation status					0.437
Psuedo R^2	0.051	0.067	0.072	0.075	0.075
X^2	80.418	106.396	113.172	118.661	119.097
df	7	8	11	13	14
Sig.	< .000	< .000	< .000	< .000	< .000

Table 4.15.

Logistic regression model for the response behavior.

Variable	Category	β	Exp(β)	Sig.
Constant	n/a	-0.471	0.624	0.040
Institution (Reference Institution 1)	2	0.110	1.116	0.481
	3	0.647	1.909	< .000
	4	-1.059	0.347	< .000
	5	-0.007	0.993	0.973
	6	0.074	1.077	0.755
	7	-0.615	0.541	0.087
	8	-0.859	0.423	0.011
Gender (Reference Male)	Female	-0.480	0.619	< .000
Race/ethnicity (Reference White)	Black	0.179	1.196	0.234
	Hispanic/Latino	-0.223	0.800	0.293
	Other	0.413	1.512	0.171
Internet access and use (Reference High users)	Computer users	-0.133	0.875	0.366
	Low users	0.121	1.129	0.451
First-generation status (Reference Not first-generation)	First-generation	0.072	1.075	0.509

Results Summary

This chapter presented results of the data analysis conducted for this study. The data were analyzed to provide answers to the two research questions of this study. Prior to addressing the research questions, however, I explored the validity and reliability of the Internet Access and Use survey instrument developed for this study. I found encouraging evidence of validity but mixed evidence of reliability. The first research question asks if it is possible to classify students along lines of Internet access and use. I addressed this question by applying k-means cluster analysis to responses to Question 1 of the Internet access and use survey. That classification scheme appeared to have merit so I used it to address the second research question which asks if there is a non-response bias associated with Internet access and use on the Web-based version of

NSSE. I answered this question using bivariate and multivariate analysis of the data focusing on the interplay between variables known to be associated with non-response (gender, race/ethnicity, first-generation status, and college or university attended), Internet access and use, and survey response. The following chapter will offer interpretation and discussion of these results.

Chapter Five: Discussion

In this chapter I will provide interpretation and discussion of the results presented in the previous chapter. I will begin by answering the research questions that have guided this study. I will then discuss specific findings followed by limitations of this study, recommendations for future research, and theoretical and practical implications of this work. A final conclusion will summarize this work and look beyond it.

Answering the Research Questions

I begin this discussion of results by directly answering the research questions that motivated this study. This will allow me to then focus on findings that cut across or supersede these specific questions. As a final reminder, the research questions are:

RQ1: What are the different patterns of Internet-connected computer ownership, access, and use within a sample of undergraduate students at U.S. institutions of higher education?

RQ2: Does this Web-based survey exhibit a significant non-response bias based on students' previous computer ownership, access, and use experiences?

Internet access and use patterns.

To answer the first research question, I constructed a brief Internet Access and Use survey and used the responses to classify students into meaningful groups that align with much of the extant research on how computer ownership and Internet access and use differs across different demographic characteristics in the United States. This is a new instrument so I also examined its validity and reliability.

The description of the construction of the instrument in Chapter Three provides evidence of face validity. I examined responses of students of different genders, race/ethnicity, and first-generation status to provide evidence of known-groups validity and the evidence is largely positive. As expected, there were few significant differences between respondents of different

genders with male respondents only reporting that they were more likely to have used multiple computers and other devices (e.g., gaming consoles) to access the Internet. The differences between first-generation and non-first-generation students, my proxy measure for social-economic status, are also unsurprising with non-first-generation students having used the Internet more each day overall and more each day with handheld mobile devices. Some of the differences between respondents of different races and ethnicities align with expectations, especially the lower use of handheld devices by White respondents as previous research has found that those who identify as Hispanic/Latino or Black are much more likely to use their mobile phone to access the Internet (Pew Internet & American Life Project, 2013). However, other findings such as Black respondents' longer use of computers to access the Internet each day do not align with expectations since even in 2014, four years after the data in this study were collected, Blacks continue to trail Whites in overall Internet usage and broadband adoption (Pew Internet & American Life Project, 2014).

I also examined the reliability of the survey instrument by examining whether students provided consistent responses to linked sets of questions. Although respondents who indicated that they had not accessed the Internet at all in the previous year were inconsistent in their responses, they were so small in number that this provides no useful evidence for reliability. Nearly all respondents who indicated that they primarily used their own computer to access the Internet also indicated that they plan to use their own computer to access the Internet during their first year of college which is positive evidence for reliability. On the other hand, most respondents who indicated that they had used a mobile device to access the Internet did not indicate that they were planning to use a mobile device to access the Internet during their first year of college which is negative evidence for reliability; I will address this later in this chapter

when I discuss the limitations of this study. On the whole, however, the instrument appeared sufficiently valid and reliable and provided sufficient variance to use the data to categorize respondents.

As described in the previous chapter, I used a k-means cluster analysis to create 3 groups. Roughly speaking, these groups are (a) "High users" who frequently and for longer periods of time accessed the Internet using computers and handheld mobile devices, (b) "Computer users" who accessed the Internet less often and for less time than High users and did not use a mobile handheld device in large numbers, and (c) "Low users" who accessed the Internet least frequently and for the least amount of time, many of whom also did not use handheld mobile devices. This is not a very elegant approach to classification but the resulting groups have acceptable validity, stability, and practical utility. In terms of validity, I again expected few or no differences between respondents of different genders and this is the case. Proportionally more White respondents were classified as Computer users and more Hispanic/Latino and first-generation students were classified as Low users which was also expected. When I split the data into two random halves and applied the clustering algorithm to them, they both exhibited the same basic structure which provides positive evidence of cluster stability.

This is a successful first attempt at operationalizing the largely qualitative literature regarding the many differences in how people, especially young people, access and use the Internet. This is a multidimensional construct and with a larger sample it may be viable to attempt classifications along multiple dimensions but this study provides valuable information on its own regarding some of the different Internet access and use patterns some U.S. college students experienced the year before they matriculated.

Non-response Bias Based on Internet Access and Use.

To answer the second research question, I followed a typical approach that analyzed the relationships between all of the variables of interest. First, I analyzed the relationship between each pair of variables using appropriate bivariate tests of independence. The most important relationship was that between Internet access and use and response status; this relationship was statistically significant, $X^2(2) = 7.635$, $p = .022$, but very weak, Cramer's V = .059. This weak relationship was a preliminary indication that the answer to this research question may be "no, there is no non-response bias linked to previous Internet access and use."

It was not enough to examine the relationship between Internet access and use and response status by themselves so I pressed on with a logistic regression analysis to determine if those variables were associated when all of the other variables' associations were also examined at the same time. The final model was statistically significant, $X^2(14) = 119.097$, $p < .000$, but with a Nagelkerke's pseudo R^2 of .075 the model has little predictive power. Moreover, Internet access and use was not a significant factor in the model. The bivariate tests analyzing the relationships between the auxiliary variables and the NSSE benchmarks also indicated that there were few relationships and they were all very weak so even if the logistic regression model indicated that Internet access and use was a meaningful predictor of survey response it still would not have mattered. All of this evidence indicates that there was not a non-response bias on this Web-based survey related to Internet access and use (as operationalized and classified in this study) for this population.

Limitations

Like all studies, this one has limitations imposed by the available resources, design of the study, and experience of the investigator. The primary limitations of this study are those

associated with the new survey instrument created for it, the way in which the study's population was selected, and the manner in which the respondents were classified along lines of previous Internet access and use.

New Internet Access and Use survey instrument. Because I could not identify an existing survey instrument that captured all of the information that that is important for this study, I created a new instrument for this study. As previously discussed, the instrument appears to have functioned well with acceptable validity but there were mixed results in the area of reliability.

Although the evidence for instrument validity is mostly positive, some of the expected differences between students with different demographic characteristics did not emerge. Given the fact that extant literature indicates that Blacks trailed Whites in broadband use at home and that those who identified as Hispanic/Latino were using the Internet and broadband at home in similar rates as Whites (Pew Internet & American Life Project, 2010), it is very striking that Black and Hispanic/Latino students in this study reported significantly higher daily Internet use with a computer compared to White students. There are two potential explanations for this unexpected finding. First, this study examined a different population compared to the other studies that provide the basis for my initial assumptions. The most reliable and accessible sources of data on Internet access in the U.S. are the Census Bureau and the Pew Internet & American Life Project. Those studies focus on the entire U.S. population whereas my population is exclusively 4-year undergraduate college students. This probably skews my population and makes them wealthier and more educated than the general population, both of which are related to higher rates of Internet access.

Second, this study explicitly went beyond the binary of the digital divide that only examines whether someone can access the Internet to include more nuanced notions of quality, type, frequency, and duration of access. Most studies, particularly older ones that still greatly influence our conceptions of Internet availability and use (e.g., Miller, 2001; National Telecommunications and Information Administration, 2000), only examined and reported on Internet access. This is equivalent to Question 1a on my Internet Access and Use survey which found no differences between broad race/ethnicity groups. However, this unexpected difference between students of different race/ethnicity emerged when I went beyond how often respondents accessed the Internet with a computer and asked respondents how long they accessed the Internet on an average day. This seems to support my decision to follow the lead of scholars like Jenkins (2006a, 2006b) who have problematized Internet access and use and made its study more nuanced.

The evidence for instrument reliability is mixed. That the tiny percentage of respondents who replied to one question that they had not used a computer to access the Internet at all did not consistently provide that answer does not trouble me since the number of such respondents – 16 – is so small that those responses could easily have been mistakes of some kind. However, that the majority of respondents who indicated they had used a non-computer device to access the Internet in the previous year but were not planning to use such a device to access the Internet during their first year of college indicates a problem.

The problem likely lies with the wording of the second question. In Question 1 I was careful to construct two separate subquestions that focus on non-computers, including 1g that focuses on handheld mobile devices and 1h that focuses on devices other than computers or mobile devices. In contrast, in Question 2f I mistakenly combined those two categories of

devices. Although Question 2f specifically mentions "cell phone" in the parenthetical, that apparently was not sufficient. In retrospect, I should have included two separate subquestions in Question 2 that used the exact same language as the subquestions in Question 1 that asked about non-computer devices.

I also faced limitations with the survey instrument in that I could only reasonably use a one-page instrument. Additional questions could have added considerable nuance to this study. In particular, the questions on the instrument focused primarily on (a) how often and under what conditions students had accessed the Internet and (b) how they planned to access the Internet during their first year of college. Additional questions focusing on what students did on the Internet would have been most welcome. It is likely that some of the questions focusing on particular uses would not exhibit much variance but they would be immensely helpful in identifying students at the extreme ends of the spectrum (e.g., students who do not use Facebook, students who do not use e-mail) who are most likely the ones who would shy away from or not even read e-mail invitations to participate in a Web-based survey.

Survey sampling. The population for this survey is drawn from only eight U.S. colleges and universities who enrolled 3,707 first-year students eligible to participate in the surveys that provided data for this study. Although I am grateful to these institutions for allowing me to include an additional survey instrument in their BCSSE survey, they are definitely a convenience sample. As described in Chapter Three, I needed to work with institutions that were using the paper BCSSE instrument one year and the Web-based NSSE instrument the following year. Although the population for this study is a diverse group, I cannot claim with any certainty that these institutions or their students are broadly representative of all U.S. colleges and universities or all first-year undergraduate students in the United States. For example, these are all four-year

institutions with one public institution. At the student level, I certainly cannot claim that these students are representative of the general U.S. since their age alone makes them a very distinctive and unrepresentative group. Further, this sample was homogenous in some ways that made it impossible to include some variables that may be important in more heterogeneous populations with age being the most prominent example of this particular limitation.

Despite this being a limitation in terms of expanding these results to the general population, this population of college and university undergraduate students is a very large and important one. As described in earlier chapters, U.S. colleges and universities are experiencing increasing scrutiny from many stakeholders so it is not only appropriate but necessary that some focus be placed on this specific population. This is particularly true for studies like this one that seek to under understand the quality of the data that are being collected for assessment and accountability purposes.

Student classification scheme. Although the three clusters I created using k-means cluster analysis to classify the respondents along lines of Internet access and use patterns have utility and exhibit some positive attributes of validity and cluster stability, they are ultimately clumsy and challenging to interpret. The k-means cluster analysis algorithm will always produce the number of clusters that the analyst demands of it but those algorithmically-produced clusters are atheoretical constructs with respect to their underlying meaning and the similarities that we expect to be present. I could not identify a more suitable way to group students together using these data but the brute force nature of the k-means clustering algorithm to which I defaulted as the procedure of last choice is a limitation of this study.

Future Research

The natural place to focus future research is to address the limitations of this study. Examining partial responses and item non-response, identifying or creating a more robust Internet access and use survey instrument, selecting a more representative population, and developing a more powerful and accessible scheme for classifying Internet access and use along its many dimensions would be fruitful areas of future research. Beyond addressing the limitations of this study, it would also be fruitful to better identify and operationalize the relationship between Internet access and use, particularly with mobile devices and along the lines of how people use the Internet.

Examine partial responses and item non-response. Every survey researcher who has some respondents who skip survey questions, especially questions at the end of the survey (i.e, survey dropoff), must determine whether to classify those people as complete respondents, partial respondents, or non-respondents. In this study, I followed the conventions of NSSE researchers who classified people only as respondents or non-respondents. This preserves the focus of this study on unit non-response and on those students who provided substantial amounts of information that is useful for practitioners. In addition, this allowed me to follow the mainstream tradition of non-response bias by using logistic regression to examine survey response as a dichotomous variable.

Although classifying survey response as a dichotomous variable is legitimate and defensible, examining response in a more nuanced manner may be fruitful. Such an approach could classify response as a more nuanced categorical value (e.g., non-respondents, partial respondents, complete respondents) or even as a continuous variable quantifying the number or percentage of questions completed. This approach could examine whether students with

different levels and kinds of previous Internet access and use begin, finish, abandon, or skip around within surveys.

More robust Internet access and use instrument. The development of a practical and more robust instrument that captures the significant dimensions of Internet access and use would be a positive development. Such an instrument would ideally be relatively short and use language that respondents easily understand. To the extent possible, it would also employ measures consistent with previous research in this area so that researchers can be assured of and able to easily examine the validity of the instrument.

Representative population. As it is impossible to responsibly generalize this study much beyond its population since it used a convenience sample, future research into both the area of classifying Internet access and use and the area of non-response bias related to Internet access and use would be significant additions to the literature. This may be the most challenging future research recommendation I can make given the difficulty of exploring non-response bias. I was very fortunate in having access to a very compliant population for the Internet Access and Use survey which was used to gather data about my study's population. Other researchers would have to be crafty or lucky to gather similarly detailed information since non-response bias inherently requires information about people who did not respond to the survey of interest. For example, it is possible to contact non-respondents using a different medium (e.g., call people on the phone if they do not respond to a Web-based survey) to attempt to gather this information but it is very costly and very difficult to gather information from a population that has already been identified as unwilling or unable to participate in the original survey. A more representative population may also be more likely to include people who have little or very poor quality access to the Internet who may not have been included in this study's sample of college students.

Researchers who are interested in college students might focus on representativeness at the institutional level since there are so many differences in students who attend different kinds of institutions. This study included four-year institutions with traditional-aged students who matriculated directly from high school. Future research including other kinds of institutions such as community colleges, institutions with older students, or for-profit institutions may provide different results. Similarly, research focusing on specific groups of students (e.g., commuter students, first-generation students, students of specific races or ethnicities) might also provide different results.

Future research into this area may also illuminate or reinforce areas where there are legitimate differences between college students and the general U.S. population. Although the prevalent beliefs and rhetoric about digital natives are problematic, "traditionally-aged" students are young, educated, and often economically privileged so they do exhibit some different Internet access and use characteristics compared to older, less educated, and poorer populations. Deeper research into this topic would also go beyond merely identifying ways in which this population differs from others but explore the impacts and causes of those differences. For example, that first-generation students in this study accessed the Internet more overall is very interesting and exploring exactly what those students do online may be useful especially if there are differences in how they are using the Internet compared to non-first-generation students. Are they merely doing the same things but more often or are there important qualitative differences in what they are doing and how they are doing it?

Classifying Internet users. It would be of great value to scholars, policy makers, and businesspeople if a relatively simple yet comprehensive and accurate means of classifying Internet user along the lines of access and use were developed. As described in my literature

review, the existing methods are very limited. One of the primary motivations for this study was to advance this agenda but I have only stumbled forward a little way and more substantive advances would be welcomed and used by many people in many different areas of research, government, and commerce. It is particularly important that such a classification include mobile access to the Internet, a means of access that has grown enormously since the original conception of the digital divide and has important qualitative differences compared to more traditional access to and use of the Internet.

Improve operationalization of Internet access and use. It was only very late in the process of writing this dissertation that I realized that many of the measures I used in this study are proxy measures for the things that are most important for understanding deeper issues related to Internet access and use. Specifically, broad questions about quality, type, frequency, and duration of Internet access and use are really ways to try to get at how people understand the Internet and the ways and purposes for which they use it. For example, researchers who have studied how technology is incorporated in primary schools in the United States have found that schools in areas that are more poor tend to focus their technology education on technology's use in the workforce whereas other schools also encourage students to use technology to explore and create. This undoubtedly shapes the way that children think of technology and their understanding of its capabilities and applicability to their lives (Ito et al., 2010). Changing the focus of this research from simplistic measures of access and use to views and understandings of the Internet is a more complex area of focus, however, and I suspect that is why most scholars in this field have remained focused on simple and easy-to-measure concepts such as frequency and duration of Internet use. The scholars who are able to push beyond these issues to address the underlying issues of agency and epistemology, especially if they do so in ways that can be

quantitatively operationalized without much difficulty, will be making a giant theoretical and practical contribution.

Implications

Theoretical implications.

The relative complexity of the clusters created to classify respondents along the lines of Internet access and use suggest that this is indeed a complex phenomenon. It does not appear to boil down simply to overall frequency and duration of Internet access. This confirms the qualitative research (e.g., boyd, 2008; Weber & Mitchell, 2008) in this area that has found that quality of access and the multiplicity of devices play an important role in shaping how people access and use the Internet.

Although there were some problems with how mobile devices were accounted for in this study it is clear that they must be included in studies and discussions of Internet access and use given their importance in the classification scheme developed in this study and the increasing ubiquity of these devices. For example, although I explored whether a fourth category of "high mobile but low computer use" exists in these data such a category did not emerge demonstrating that the relationship between mobile and computer Internet access and use is not simple and straight-forward. Researchers such as Hargittai (2002), Jenkins (2006a, 2006b), Selwyn (2004), and Zittrain (2008) have concerns about how the different affordances offered by different devices can create inequalities and imbalances, especially when people only have access to devices or are in situations that limit their ability to fully participate in the creative and generative activities that are powerfully enabled by high-quality access to the Internet in supportive environments. It remains to be seen how these concerns will play out as mobile devices – first phones and now tablet computers and e-readers – continue their spread.

Practical implications.

The most direct and concrete implication of this study is that there may not be a non-response bias related to Internet access and use for surveys administered via the World Wide Web. It would not be much of a stretch to generalize this study a bit to theorize that this may be true for full-time, traditionally-aged students at other U.S. colleges and universities. However, it is dangerous to generalize the results of this study much beyond the study's small and specific population although it seems likely that these results hold for some larger populations, especially the younger and more privileged people in the United States who share many similarities with this study's population.

Even with that caveat and its limitations, this study has direct implications for higher education assessment professionals and survey researchers focused on college and university students. Since Web-based surveys do not appear to suffer from significant non-response bias along the lines of gender, race/ethnicity, SES, or Internet access and use, we can continue to use Web-based survey tools that are increasingly powerful, accessible, and cheap. We can use those tools without worrying significantly that their mere use reproduces problematic and disturbing inequalities that challenge some of our most vulnerable students. Survey researchers, in particular, can take advantage of the huge cost and scale advantages of Web-based surveys without introducing non-response bias into their data along the lines of these student characteristics. The survey projects like NSSE that have moved away from offering a paper-based survey option can continue to realize immense savings without having introduced a significant new source of systematic survey error.

This study also demonstrates that there is utility even in a relatively short Internet access and use survey that has several limitations and requires further development. The procedures

employed in this study to collect these data and classify the respondents are well within the abilities of researchers and practitioners with modest survey administration and data analysis capabilities. If processed and disseminated in a timely manner, especially if that is done during the summer prior to students arriving on-campus in the fall, the data collected via this instrument could be very helpful to campus administrators in understanding some of the characteristics and expectations of their students. This would be more even more powerful if they followed the recommendation above to include several questions that directly focus on how students use the Internet. This could help information technology professionals predict network usage and support demands, faculty and faculty developers gain a realistic understanding of the ability and willingness of students to use technology in coursework, and student life professionals better understand how and if students are using the Internet in creative and useful ways.

Faculty and those that assist faculty (e.g., faculty developers, instructional designers) may be among those who could profit the most from understanding how students access and use the Internet. The near ubiquity of course management systems requires students to frequently and competently access the Internet so it is comforting that virtually all of the students in this study, including those classified among the low use group, made frequent use of the Internet often using multiple devices. These results should extend to faculty- and course-centric applications such as student evaluations of teaching and online tests enabling faculty, chairs, and deans to collect important data without unduly worrying about leaving out these groups of students.

Conclusion

There were two driving forces for this study. First, I wanted to add my voice to the chorus of scholars who have challenged the assumptions of the “Digital natives” metaphor that assumes a uniformly high level of technology experience and skills among younger,

undergraduate students in the United States. Using this relatively short and limited Internet Access and Use survey instrument, it is clear that even this relatively limited group of students has had a wide variety of Internet access and use experiences contrary to assumptions of uniformly high levels of Internet access and use.

Although this study ties together qualitative work done with youths and the challenging survey methodology exploration of non-response bias, it is fundamentally about inequalities and representation. Cutting through all of the jargon and complexity, the second driving force for this was this question: Are we silencing the voices of some of our most underresourced and vulnerable students simply because the medium we frequently use to solicit their input is unfamiliar or relatively inaccessible to them? Although this study does not definitively answer the question, it is a relief that it at least points in the direction of "no." It remains possible, however, that this population is so small or difficult to identify and reach that this is a genuine problem. We must remain on our guard that we do not allow our assumptions or our convenient access to specific resources to inadvertently shut out some of our students, especially those who most need our support. We have a moral obligation to ensure all of our students have the opportunity to be heard, not just those whose background and experiences match our expectations and assumptions.

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Appendix A

Internet Access and Use Survey Instrument

Additional Questions

You are requested to answer some additional questions regarding your previous Internet access experiences. These questions take about three minutes to answer. Your continued participation is voluntary.

During the last 12 months...

A1. How often did you use a computer (desktop, laptop, notebook, tablet, etc.) to access the Internet?

- ☐ Several times a day
- ☐ About once a day
- ☐ 3-5 days a week
- ☐ 1-2 days a week
- ☐ Every few weeks
- ☐ Less often or never

A2. On a typical day, for how many hours each day did you use a computer (desktop, laptop, notebook, tablet, etc.) to access the Internet?

- ☐ 7 hours or more
- ☐ 6 to 7 hours
- ☐ 5 to 6 hours
- ☐ 4 to 5 hours
- ☐ 3 to 4 hours
- ☐ 2 to 3 hours
- ☐ 1 to 2 hours
- ☐ Less than 1 hour

A3. On the computer you use most often to access the Internet, could you connect to all websites, (i.e. was the Internet connection censored or filtered)?

- ☐ Yes, but I could connect to all websites
- ☐ No, but I could connect to most websites
- ☐ No, I could only connect to a few websites
- ☐ I did not use a computer to access the Internet at all
- ☐ I do not know

A4. When you connected to the Internet on the computer you used most often, were you supervised by parents, teachers, librarians, or others?

- ☐ No, I was always unsupervised
- ☐ Yes, I was sometimes supervised
- ☐ Yes, I was always supervised
- ☐ I did not use a computer to access the Internet at all
- ☐ I do not know

A5. Did you or your family own the computer you used most often to connect to the Internet?

- ☐ Yes, the computer belonged just to me
- ☐ Yes, the computer belonged to my family
- ☐ No, the computer did not belong to me or my family
- ☐ I did not use a computer to access the Internet at all

A6. Did you regularly use multiple computers (your computer, school's computer, library's computer, etc.) to access the Internet?

- ☐ Yes, I used multiple computers
- ☐ No, I only used one computer
- ☐ I did not use a computer to access the Internet at all

A7. How often did you use a handheld mobile device (cell phone, Blackberry, iPhone, etc.) to access the Internet?

- ☐ Several times a day
- ☐ Once or twice a day
- ☐ Several times a week
- ☐ Once or twice a week
- ☐ Several times a month
- ☐ Never

A8. Did you regularly use something other than a computer or mobile device (game console, e-book reader, etc.) to access the Internet?

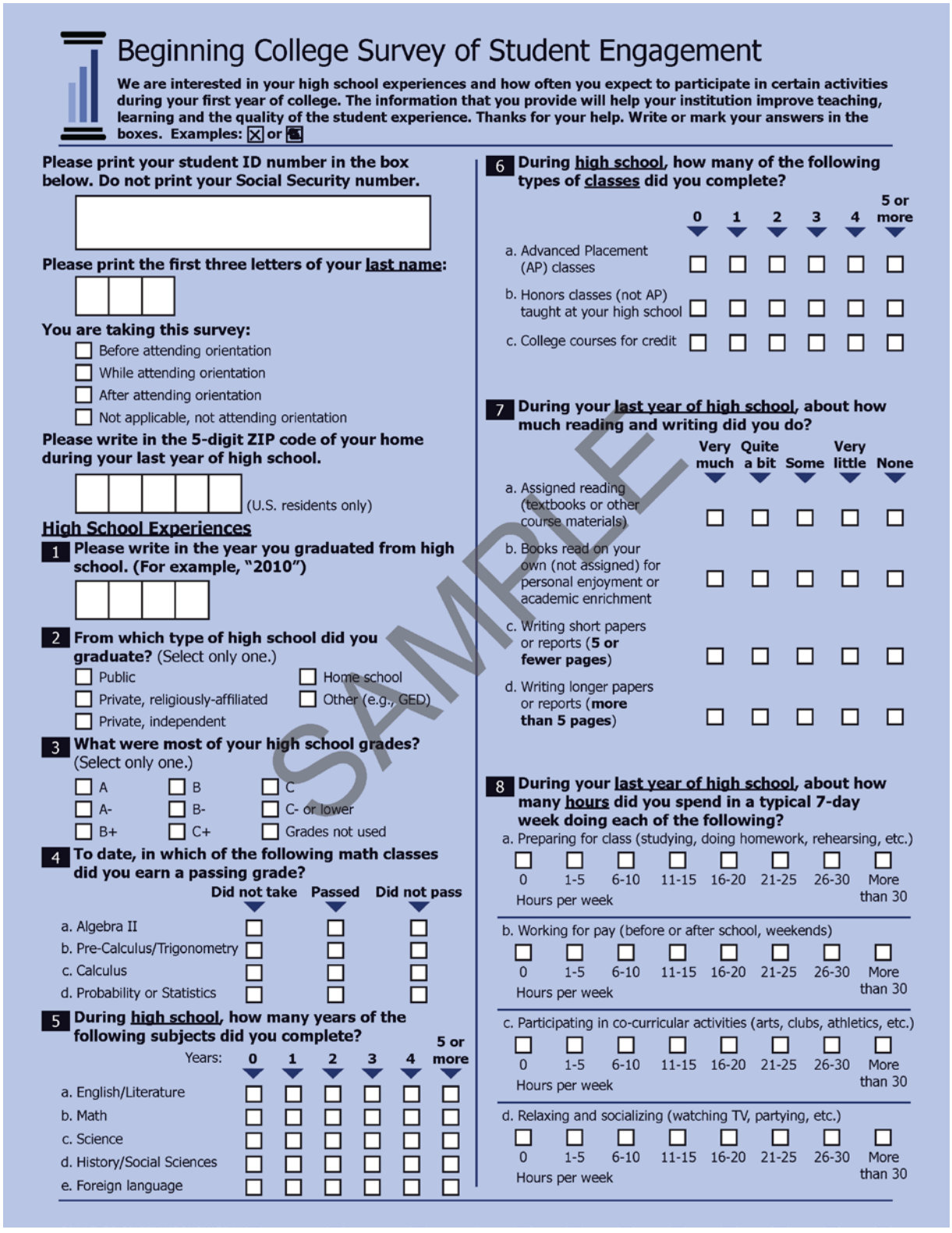
- ☐ Yes, I accessed the Internet using other devices
- ☐ No, I only accessed the Internet using a computer or mobile device
- ☐ I did not access the Internet at all

2. How will you access the Internet on a regular basis during your next year in college? (Select all that apply.)

- ☐ I will use my own computer
- ☐ I will use my family's computer
- ☐ I will use someone else's (friend, roommate, etc.) computer
- ☐ I will use computers on campus (computer labs, library, etc.)
- ☐ I will use something other than a computer (cell phone, game console, etc.)
- ☐ I will not access the Internet
- ☐ I do not know

Appendix B

BCSSE 2010 Paper Survey Instrument



Beginning College Survey of Student Engagement

We are interested in your high school experiences and how often you expect to participate in certain activities during your first year of college. The information that you provide will help your institution improve teaching, learning and the quality of the student experience. Thanks for your help. Write or mark your answers in the boxes. Examples: ☒ or ☑

Please print your student ID number in the box below. Do not print your Social Security number.

Please print the first three letters of your last name:

You are taking this survey:

- ☐ Before attending orientation
- ☐ While attending orientation
- ☐ After attending orientation
- ☐ Not applicable, not attending orientation

Please write in the 5-digit ZIP code of your home during your last year of high school.

(U.S. residents only)

High School Experiences

1 Please write in the year you graduated from high school. (For example, "2010")

2 From which type of high school did you graduate? (Select only one.)

- ☐ Public
- ☐ Home school
- ☐ Private, religiously-affiliated
- ☐ Other (e.g., GED)
- ☐ Private, independent

3 What were most of your high school grades? (Select only one.)

- ☐ A
- ☐ B
- ☐ C
- ☐ A-
- ☐ B-
- ☐ C- or lower
- ☐ B+
- ☐ C+
- ☐ Grades not used

4 To date, in which of the following math classes did you earn a passing grade?

	Did not take	Passed	Did not pass
a. Algebra II	☐	☐	☐
b. Pre-Calculus/Trigonometry	☐	☐	☐
c. Calculus	☐	☐	☐
d. Probability or Statistics	☐	☐	☐

5 During high school, how many years of the following subjects did you complete?

Years:	0	1	2	3	4	5 or more
a. English/Literature	☐	☐	☐	☐	☐	☐
b. Math	☐	☐	☐	☐	☐	☐
c. Science	☐	☐	☐	☐	☐	☐
d. History/Social Sciences	☐	☐	☐	☐	☐	☐
e. Foreign language	☐	☐	☐	☐	☐	☐

6 During high school, how many of the following types of classes did you complete?

	0	1	2	3	4	5 or more
a. Advanced Placement (AP) classes	☐	☐	☐	☐	☐	☐
b. Honors classes (not AP) taught at your high school	☐	☐	☐	☐	☐	☐
c. College courses for credit	☐	☐	☐	☐	☐	☐

7 During your last year of high school, about how much reading and writing did you do?

	Very much	Quite a bit	Some	Very little	None
a. Assigned reading (textbooks or other course materials)	☐	☐	☐	☐	☐
b. Books read on your own (not assigned) for personal enjoyment or academic enrichment	☐	☐	☐	☐	☐
c. Writing short papers or reports (**5 or fewer pages**)	☐	☐	☐	☐	☐
d. Writing longer papers or reports (**more than 5 pages**)	☐	☐	☐	☐	☐

8 During your last year of high school, about how many hours did you spend in a typical 7-day week doing each of the following?

a. Preparing for class (studying, doing homework, rehearsing, etc.)

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

b. Working for pay (before or after school, weekends)

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

c. Participating in co-curricular activities (arts, clubs, athletics, etc.)

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

d. Relaxing and socializing (watching TV, partying, etc.)

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

9 **During your last year of high school about how often did you do each of the following?**

	Very often	Often	Some-times	Never
a. Asked questions in class or contributed to class discussions	☐	☐	☐	☐
b. Made a class presentation	☐	☐	☐	☐
c. Came to class without completing readings or assignments	☐	☐	☐	☐
d. Discussed grades or assignments with a teacher	☐	☐	☐	☐
e. Worked with other students on projects **during class**	☐	☐	☐	☐
f. Worked with classmates **outside of class** to prepare class assignments	☐	☐	☐	☐
g. Prepared two or more drafts of a paper or assignment before turning it in	☐	☐	☐	☐
h. Had serious conversations with students of a different race or ethnicity than your own	☐	☐	☐	☐
i. Discussed ideas from your readings or classes with teachers outside of class	☐	☐	☐	☐
j. Discussed ideas from your readings or classes with others outside of class (students, family members, etc.)	☐	☐	☐	☐
k. Talked with a counselor, teacher, or other staff member about college or career plans	☐	☐	☐	☐
l. Had serious conversations with students who are very different from you in terms of their religious beliefs, political opinions, or personal values	☐	☐	☐	☐
m. Missed a day of school	☐	☐	☐	☐

10 **Did you take the SAT and/or ACT?**

☐ Yes ☐ No

If yes, please write your scores below (as best you remember):

SAT (possible range=200-800)

Critical Reading ☐☐☐

Mathematical Reasoning ☐☐☐

Writing ☐☐☐

ACT (possible range=1-36)

Composite ☐☐

11 **During your high school years, how involved were you in the following activities at your school or elsewhere?**

	Not involved 1	2	3	4	5	Highly involved 6
a. Performing or visual arts programs (band, chorus, theater, art, etc.)	☐	☐	☐	☐	☐	☐
b. Athletic teams (varsity, junior varsity, club sport, etc.)	☐	☐	☐	☐	☐	☐
c. Student government	☐	☐	☐	☐	☐	☐
d. Publications (student newspaper, yearbook, etc.)	☐	☐	☐	☐	☐	☐
e. Academic honor societies	☐	☐	☐	☐	☐	☐
f. Academic clubs (debate, mathematics, science, etc.)	☐	☐	☐	☐	☐	☐
g. Vocational clubs (business, health, technology, etc.)	☐	☐	☐	☐	☐	☐
h. Religious youth groups	☐	☐	☐	☐	☐	☐
i. Community service or volunteer work	☐	☐	☐	☐	☐	☐

12 **Overall, how academically challenging was your high school?**

Not at all challenging — Extremely challenging

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

College Experiences

13 **During the coming school year, about how many hours do you think you will spend in a typical 7-day week doing each of the following?**

a. Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

b. Working for pay on- or off- campus

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

c. Participating in co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.)

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

d. Relaxing and socializing (watching TV, partying, etc.)

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ More than 30

Hours per week

14 **During the coming school year, about how often do you expect to do each of the following?**

	Very often	Often	Some-times	Never
a. Ask questions in class or contribute to class discussions	☐	☐	☐	☐
b. Make a class presentation	☐	☐	☐	☐
c. Work on a paper or project that requires integrating ideas or information from various sources	☐	☐	☐	☐
d. Work with other students on projects **during class**	☐	☐	☐	☐
e. Work with classmates **outside of class** to prepare class assignments	☐	☐	☐	☐
f. Put together ideas or concepts from different courses when completing assignments or during class discussions	☐	☐	☐	☐
g. Discuss grades or assignments with an instructor	☐	☐	☐	☐
h. Discuss ideas from your readings or classes with faculty members outside of class	☐	☐	☐	☐
i. Receive prompt feedback from faculty on your academic performance (written or oral)	☐	☐	☐	☐
j. Work with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)	☐	☐	☐	☐
k. Discuss ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)	☐	☐	☐	☐
l. Have serious conversations with students of a different race or ethnicity than your own	☐	☐	☐	☐
m. Try to better understand someone else's views by imagining how an issue looks from his or her perspective	☐	☐	☐	☐
n. Learn something that changes the way you understand an issue or idea	☐	☐	☐	☐
o. Have serious conversations with students who are very different from you in terms of their religious beliefs, political opinions, or personal values	☐	☐	☐	☐

15 **During the coming school year, how certain are you that you will do the following?**

	Not at all certain 1	2	3	4	5	Very certain 6
a. Study when there are other interesting things to do	☐	☐	☐	☐	☐	☐
b. Find additional information for course assignments when you don't understand the material	☐	☐	☐	☐	☐	☐
c. Participate regularly in course discussions, even when you don't feel like it	☐	☐	☐	☐	☐	☐
d. Ask instructors for help when you struggle with course assignments	☐	☐	☐	☐	☐	☐
e. Finish something you have started when you encounter challenges	☐	☐	☐	☐	☐	☐
f. Stay positive, even when you do poorly on a test or assignment	☐	☐	☐	☐	☐	☐

16 **During the coming school year, how difficult do you expect the following to be?**

	Not at all difficult 1	2	3	4	5	Very difficult 6
a. Learning course material	☐	☐	☐	☐	☐	☐
b. Managing your time	☐	☐	☐	☐	☐	☐
c. Paying college expenses	☐	☐	☐	☐	☐	☐
d. Getting help with school work	☐	☐	☐	☐	☐	☐
e. Making new friends	☐	☐	☐	☐	☐	☐
f. Interacting with faculty	☐	☐	☐	☐	☐	☐

17 **How prepared are you to do the following in your academic work at this college?**

	Not at all prepared 1	2	3	4	5	Very prepared 6
a. Write clearly and effectively	☐	☐	☐	☐	☐	☐
b. Speak clearly and effectively	☐	☐	☐	☐	☐	☐
c. Think critically and analytically	☐	☐	☐	☐	☐	☐
d. Analyze math or quantitative problems	☐	☐	☐	☐	☐	☐
e. Use computing and information technology	☐	☐	☐	☐	☐	☐
f. Work effectively with others	☐	☐	☐	☐	☐	☐
g. Learn effectively on your own	☐	☐	☐	☐	☐	☐

18 **How important is it to you that your college or university provides each of the following?**

	Not important 1	2	3	4	5	Very important 6
a. A challenging academic experience	☐	☐	☐	☐	☐	☐
b. Support to help you succeed academically	☐	☐	☐	☐	☐	☐
c. Opportunities to interact with students from different economic, social, and racial or ethnic backgrounds	☐	☐	☐	☐	☐	☐
d. Assistance coping with your non-academic responsibilities (work, family, etc.)	☐	☐	☐	☐	☐	☐
e. Support to help you thrive socially	☐	☐	☐	☐	☐	☐
f. Opportunities to attend campus events and activities	☐	☐	☐	☐	☐	☐

19 **About how much of your college expenses (tuition, fees, books, room & board) this year will be provided by each of the following sources?**

	None	Less than half	Half or more	All or nearly all	Do not know
a. Scholarships and grants	☐	☐	☐	☐	☐
b. Student loans	☐	☐	☐	☐	☐
c. Parents/family	☐	☐	☐	☐	☐
d. Self (work on-campus or off-campus, savings)	☐	☐	☐	☐	☐

20 **Did you receive a Federal Pell Grant?**

☐ Yes ☐ No ☐ Do not know

21 **What do you expect most of your grades will be at this college during the coming year?**
(Select only one.)

☐ A ☐ B ☐ C
☐ A- ☐ B- ☐ C- or lower
☐ B+ ☐ C+ ☐ Grades not used

22 **Do you intend to graduate from <u>this college</u>?**

☐ Yes ☐ No ☐ Uncertain

23 **What is the highest academic degree that you intend to obtain at this <u>or any</u> college?**
(Select only one.)

☐ Associate's degree (A.A., A.S., etc.)
☐ Bachelor's degree (B.A., B.S., etc.)
☐ Master's degree (M.A., M.S., etc.)
☐ Doctoral degree (Ph.D., M.D., J.D., etc.)
☐ Uncertain

Additional Information

24 **What month are you completing this survey?**

☐ Jan ☐ May ☐ Sep
☐ Feb ☐ Jun ☐ Oct
☐ Mar ☐ Jul ☐ Nov
☐ Apr ☐ Aug ☐ Dec

25 **Do you know what your major will be?**

☐ No
☐ Yes, specify: _____

26 **Are you, or will you be, a full-time student this fall term?**

☐ Yes ☐ No

27 **How many of your <u>close</u> friends will attend this college during the coming year?**

☐ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

28 **Your sex:**

☐ Female ☐ Male

29 **Are you an international student or foreign national?**

☐ Yes ☐ No

30 **What is your racial or ethnic identification?**
(Select only one.)

☐ American Indian or other Native American
☐ Asian, Asian American, or Pacific Islander
☐ Black or African American
☐ White (non-Hispanic)
☐ Mexican or Mexican American
☐ Puerto Rican
☐ Other Hispanic or Latino
☐ Multiracial
☐ Other
☐ I prefer not to respond

31 **Please indicate whether your parents completed a 4-year college degree.**

	Completed 4-year degree	Did not complete 4-year degree	Do not know
Mother (or guardian)	☐	☐	☐
Father (or guardian)	☐	☐	☐

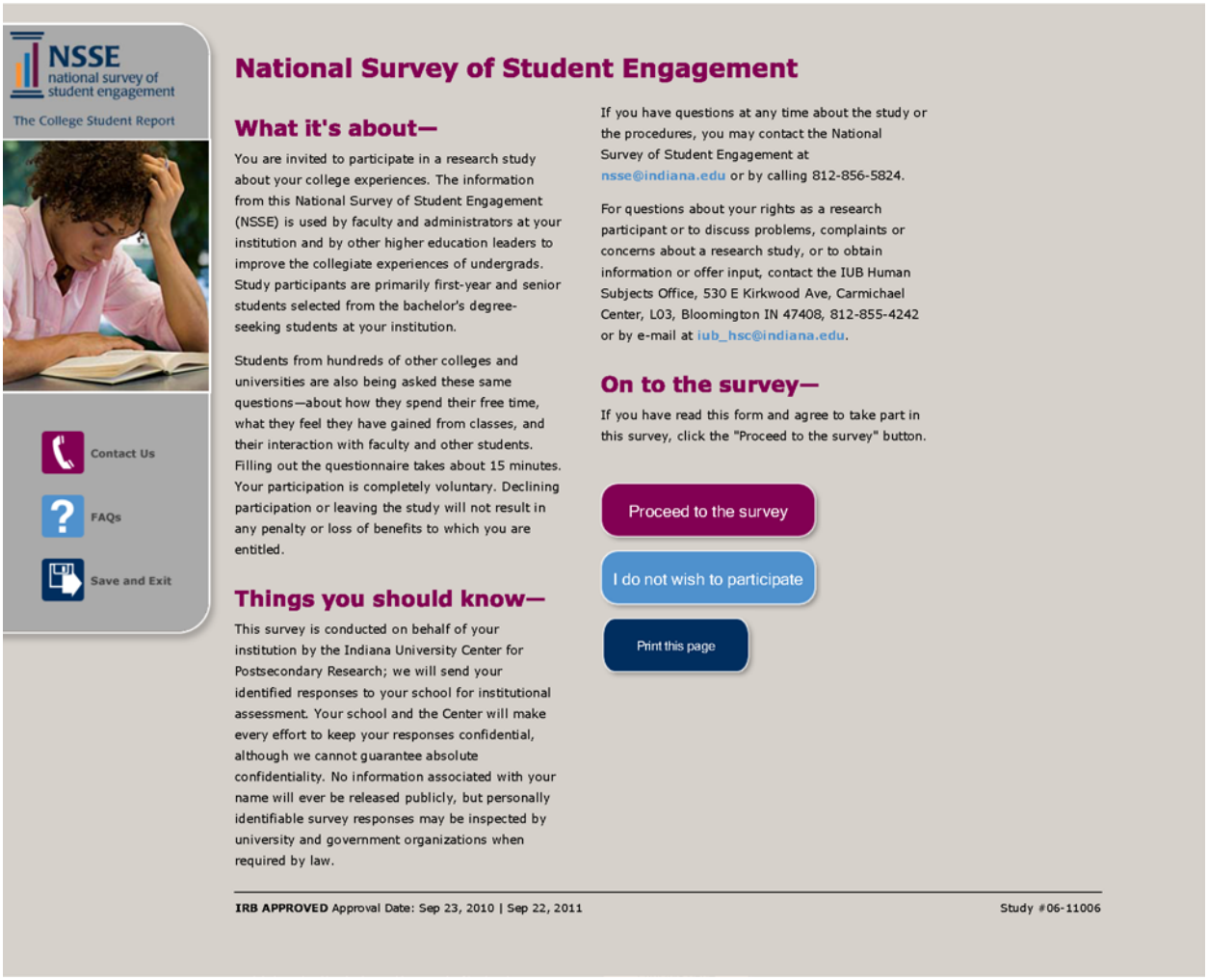
32 **How far is your home from this college?**

☐ 20 miles or less ☐ 101-200 miles
☐ 21-50 miles ☐ 201-400 miles
☐ 51-100 miles ☐ More than 400 miles

THANKS FOR SHARING YOUR RESPONSES!

Appendix C

NSSE 2011 Web Survey Instrument



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FAQs

Save and Exit

In your experience at your institution during the current school year, about how often have you done each of the following?

	Very often	Often	Some-times	Never
Asked questions in class or contributed to class discussions				
Made a class presentation				
Prepared two or more drafts of a paper or assignment before turning it in				
Worked on a paper or project that required integrating ideas or information from various sources				
Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments				
Come to class without completing readings or assignments				
Worked with other students on projects **during class**				
Worked with classmates **outside of class** to prepare class assignments				

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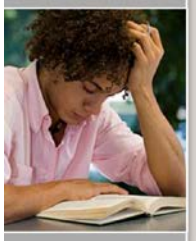

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FAQs

Save and Exit

In your experience at your institution during the current school year, about how often have you done each of the following?

	Very often	Often	Some-times	Never
Put together ideas or concepts from different courses when completing assignments or during class discussions				
Tutored or taught other students (paid or voluntary)				
Participated in a community-based project (e.g., service learning) as part of a regular course				
Used an electronic medium (listserv, chat group, Internet, instant messaging, etc.) to discuss or complete an assignment				
Used e-mail to communicate with an instructor				
Discussed grades or assignments with an instructor				
Talked about career plans with a faculty member or advisor				
Discussed ideas from your readings or classes with faculty members outside of class				

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Save and Exit

In your experience at your institution during the current school year, about how often have you done each of the following?

	Very often	Often	Some-times	Never
Received prompt written or oral feedback from faculty on your academic performance	○	○	○	○
Worked harder than you thought you could to meet an instructor's standards or expectations	○	○	○	○
Worked with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)	○	○	○	○
Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)	○	○	○	○
Had serious conversations with students of a different race or ethnicity than your own	○	○	○	○
Had serious conversations with students who are very different from you in terms of their religious beliefs, political opinions, or personal values	○	○	○	○

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During the current school year, how much has your coursework emphasized the following mental activities?

	Very much	Quite a bit	Some	Very little
Memorizing facts, ideas, or methods from your courses and readings so you can repeat them in pretty much the same form	○	○	○	○
Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components	○	○	○	○
Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships	○	○	○	○
Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions	○	○	○	○
Applying theories or concepts to practical problems or in new situations	○	○	○	○

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FAQs

Save and Exit

During the current *school year*, about how much reading and writing have you done?

Number of assigned textbooks, books, or book-length packs of course readings

None 1-4 5-10 11-20 More than 20

Number of books read on your own (not assigned) for personal enjoyment or academic enrichment

None 1-4 5-10 11-20 More than 20

Number of written papers or reports of **20 pages or more**

None 1-4 5-10 11-20 More than 20

Number of written papers or reports **between 5 and 19 pages**

None 1-4 5-10 11-20 More than 20

Number of written papers or reports of **fewer than 5 pages**

None 1-4 5-10 11-20 More than 20

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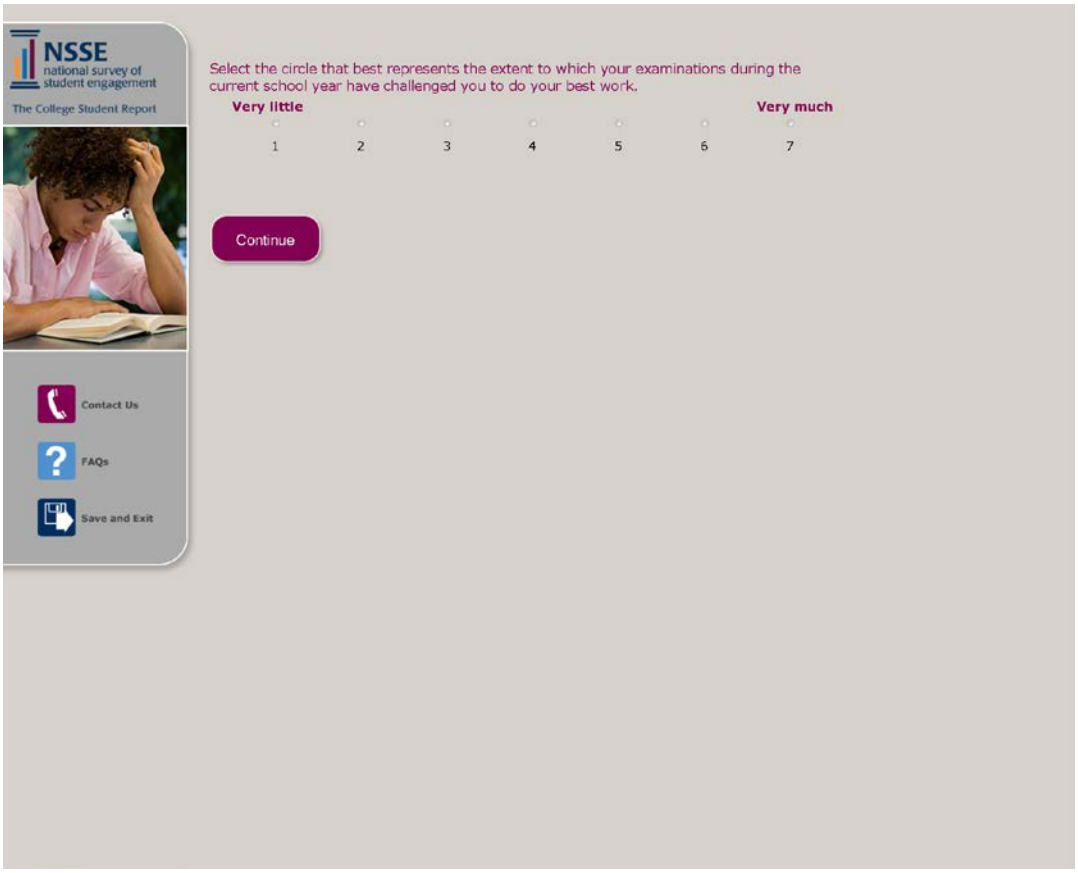
FAQs

Save and Exit

In a *typical week*, how many homework problem sets do you complete?

	None	1-2	3-4	5-6	More than 6
Number of problem sets that take you **more** than an hour to complete	○	○	○	○	○
Number of problem sets that take you **less** than an hour to complete	○	○	○	○	○

Continue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Save and Exit
Select the circle that best represents the extent to which your examinations during the current school year have challenged you to do your best work.
Very little
Very much
1
2
3
4
5
6
7
Continue

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FAQs

Save and Exit

During the current school year, about how often have you done each of the following?

	Very often	Often	Some-times	Never
Attended an art exhibit, play, dance, music, theater, or other performance	○	○	○	○
Exercised or participated in physical fitness activities	○	○	○	○
Participated in activities to enhance your spirituality (worship, meditation, prayer, etc.)	○	○	○	○
Examined the strengths and weaknesses of your own views on a topic or issue	○	○	○	○
Tried to better understand someone else's views by imagining how an issue looks from his or her perspective	○	○	○	○
Learned something that changed the way you understand an issue or concept	○	○	○	○

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Which of the following have you done or do you plan to do before you graduate from your institution?

	Done	Plan to do	Do not plan to do	Have not decided
Practicum, internship, field experience, co-op experience, or clinical assignment				
Community service or volunteer work				
Participate in a learning community or some other formal program where groups of students take two or more classes together				
Work on a research project with a faculty member outside of course or program requirements				
Foreign language coursework				
Study abroad				
Independent study or self-designed major				
Culminating senior experience (capstone course, senior project or thesis, comprehensive exam, etc.)				

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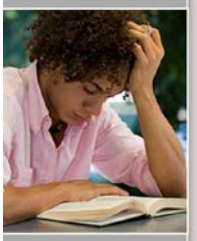

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FAQs

Save and Exit

Select the circle that best represents the quality of your relationships with people at your institution.

Relationships with **other students**

Unfriendly, Unsupportive, Sense of alienation						Friendly, Supportive, Sense of belonging
1	2	3	4	5	6	7

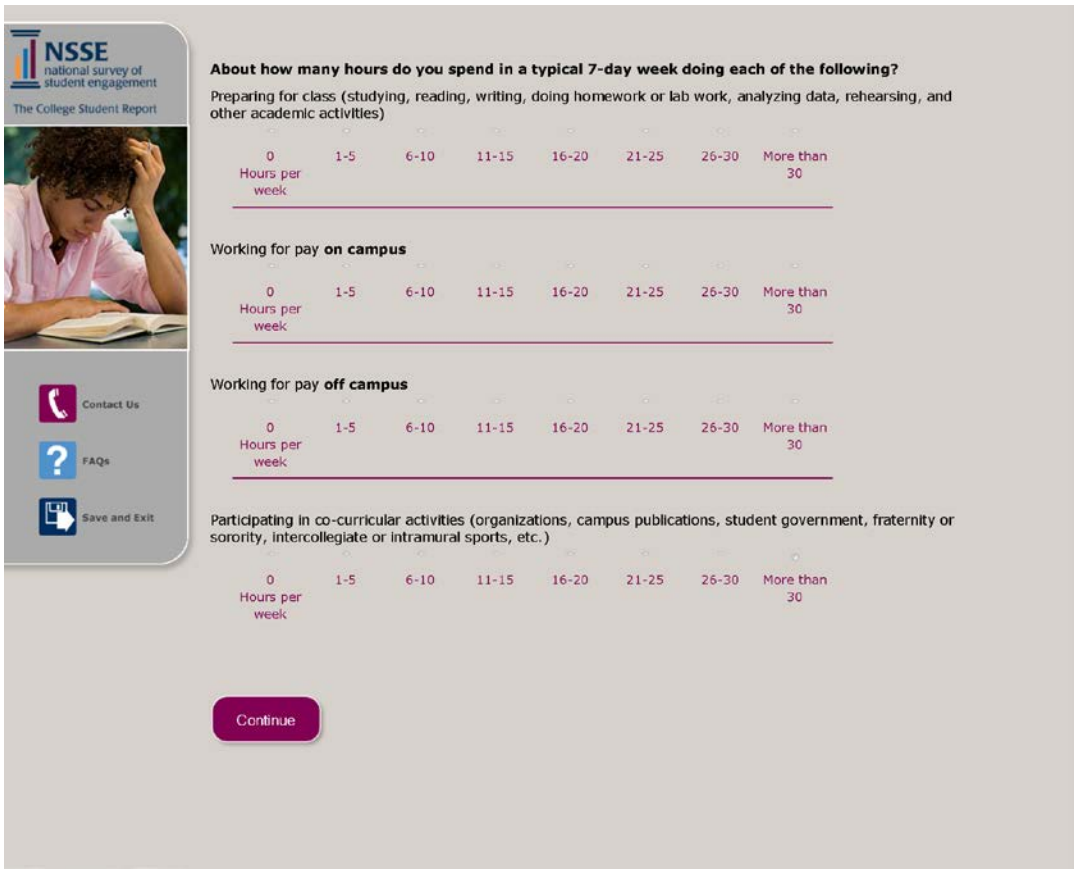
Relationships with **faculty members**

Unavailable, Unhelpful, Unsympathetic						Available, Helpful, Sympathetic
1	2	3	4	5	6	7

Relationships with **administrative personnel and offices**

Unhelpful, Inconsiderate, Rigid						Helpful, Considerate, Flexible
1	2	3	4	5	6	7

Continue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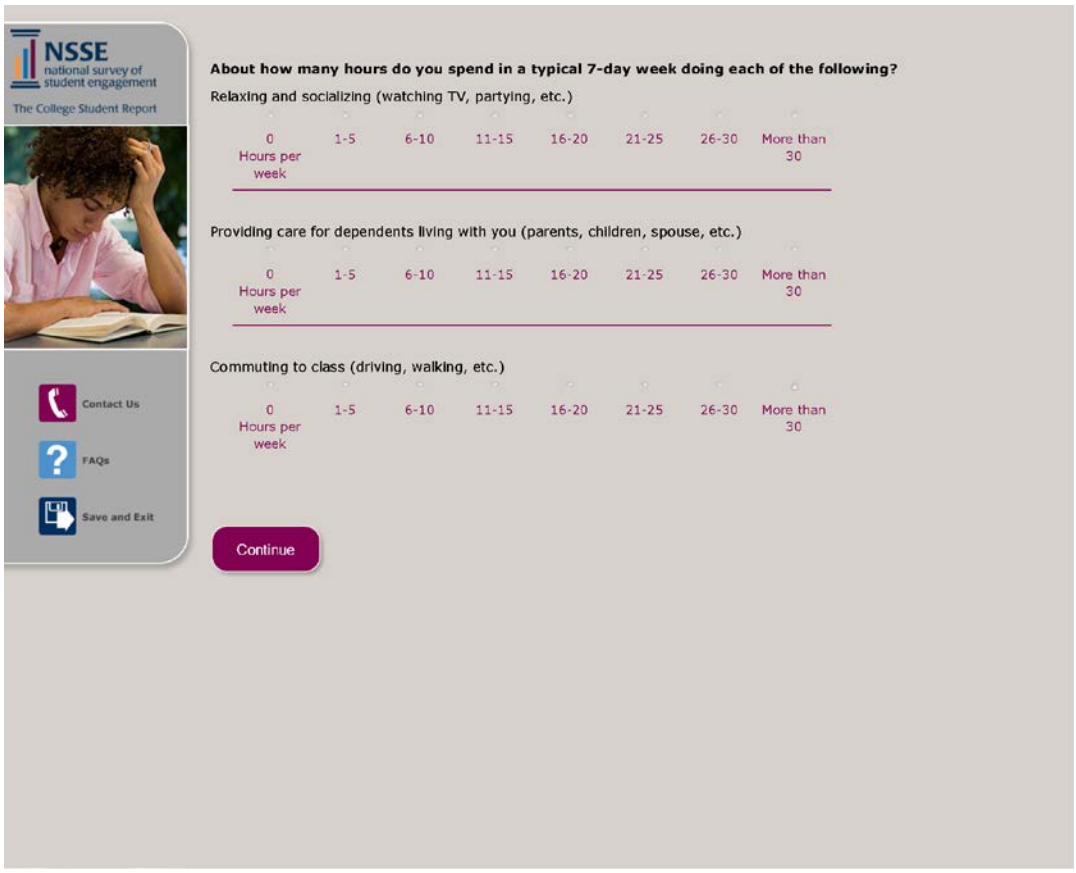
Save and Exit
About how many hours do you spend in a typical 7-day week doing each of the following?
Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)
0 Hours per week
1-5
6-10
11-15
16-20
21-25
26-30
More than 30
Working for pay on campus
0 Hours per week
1-5
6-10
11-15
16-20
21-25
26-30
More than 30
Working for pay off campus
0 Hours per week
1-5
6-10
11-15
16-20
21-25
26-30
More than 30
Participating in co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.)
0 Hours per week
1-5
6-10
11-15
16-20
21-25
26-30
More than 30
Continue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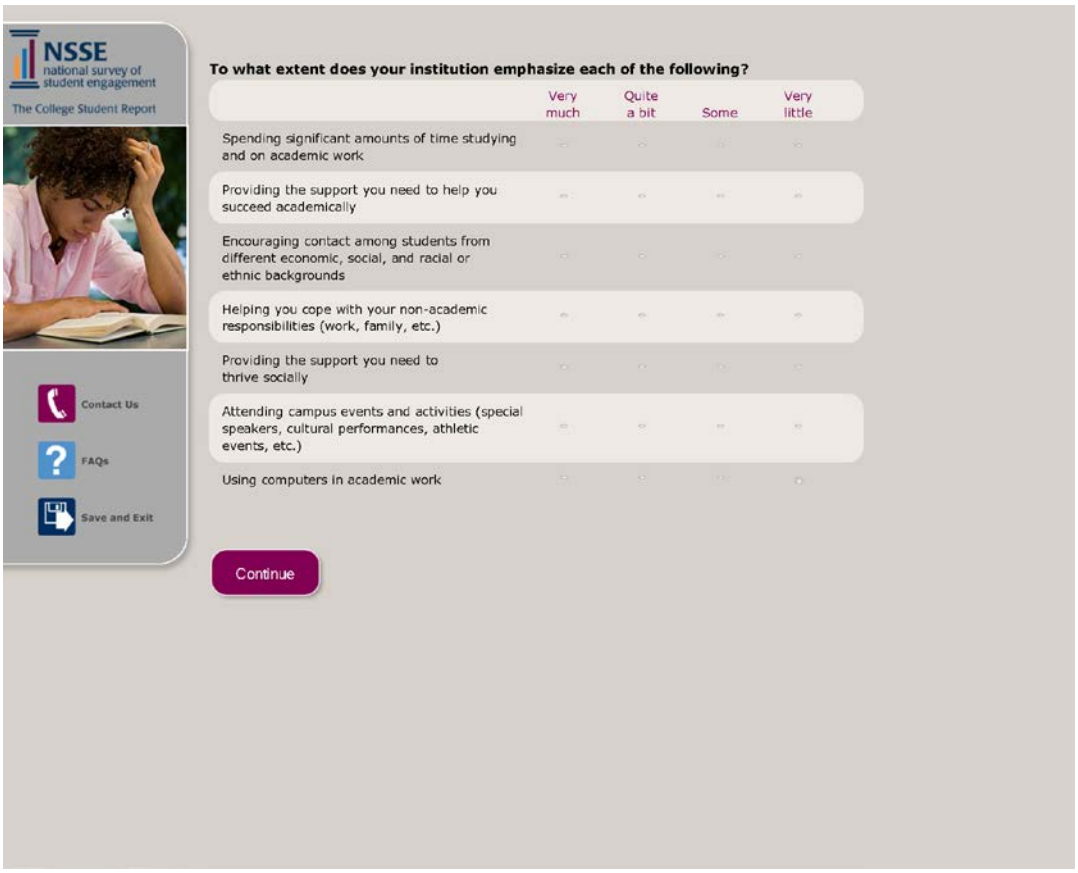
About how many hours do you spend in a typical 7-day week doing each of the following?
Relaxing and socializing (watching TV, partying, etc.)
0 Hours per week
1-5
6-10
11-15
16-20
21-25
26-30
More than 30
Providing care for dependents living with you (parents, children, spouse, etc.)
0 Hours per week
1-5
6-10
11-15
16-20
21-25
26-30
More than 30
Commuting to class (driving, walking, etc.)
0 Hours per week
1-5
6-10
11-15
16-20
21-25
26-30
More than 30
Continue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To what extent does your institution emphasize each of the following?
Very much
Quite a bit
Some
Very little
Spending significant amounts of time studying and on academic work
Providing the support you need to help you succeed academically
Encouraging contact among students from different economic, social, and racial or ethnic backgrounds
Helping you cope with your non-academic responsibilities (work, family, etc.)
Providing the support you need to thrive socially
Attending campus events and activities (special speakers, cultural performances, athletic events, etc.)
Using computers in academic work
Continue

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To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas?

	Very much	Quite a bit	Some	Very little
Acquiring a broad general education	○	○	○	○
Acquiring job or work-related knowledge and skills	○	○	○	○
Writing clearly and effectively	○	○	○	○
Speaking clearly and effectively	○	○	○	○
Thinking critically and analytically	○	○	○	○
Analyzing quantitative problems	○	○	○	○
Using computing and information technology	○	○	○	○
Working effectively with others	○	○	○	○

Continue

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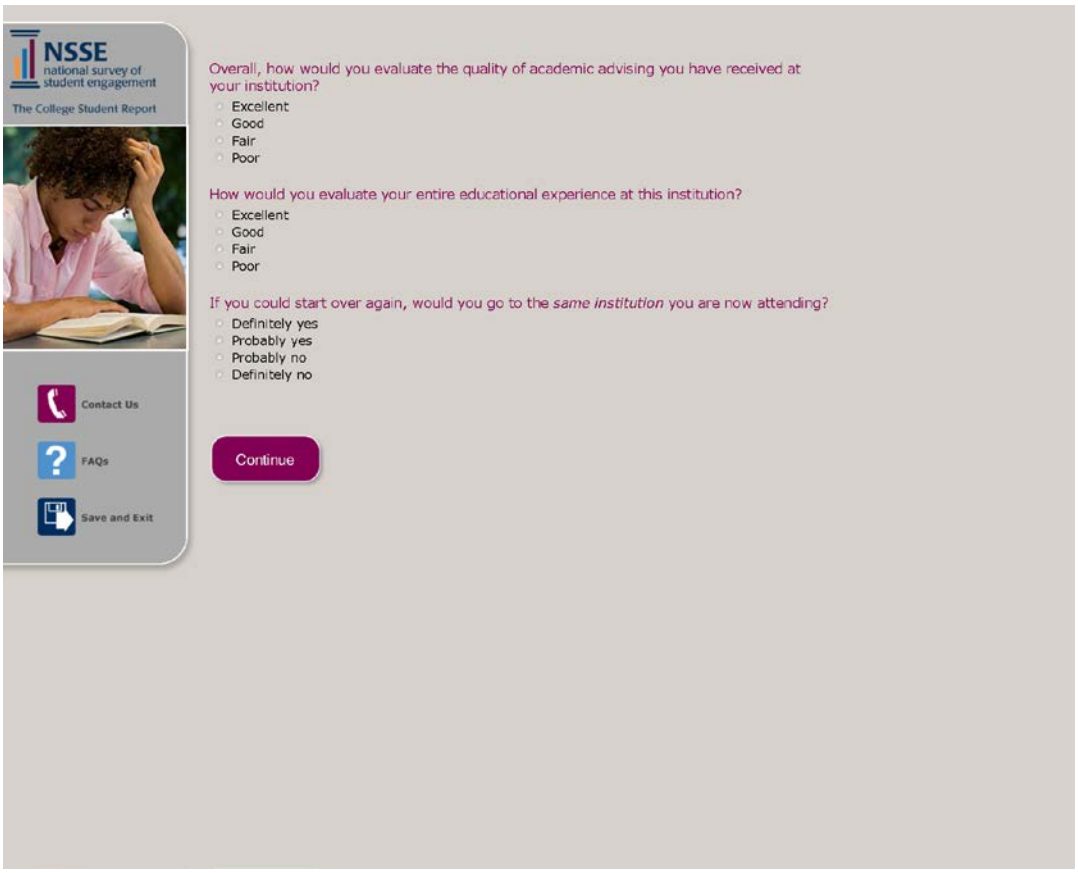
To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas?

	Very much	Quite a bit	Some	Very little
Voting in local, state, or national elections	○	○	○	○
Learning effectively on your own	○	○	○	○
Understanding yourself	○	○	○	○
Understanding people of other racial and ethnic backgrounds	○	○	○	○
Solving complex real-world problems	○	○	○	○
Developing a personal code of values and ethics	○	○	○	○
Contributing to the welfare of your community	○	○	○	○
Developing a deepened sense of spirituality	○	○	○	○

Continue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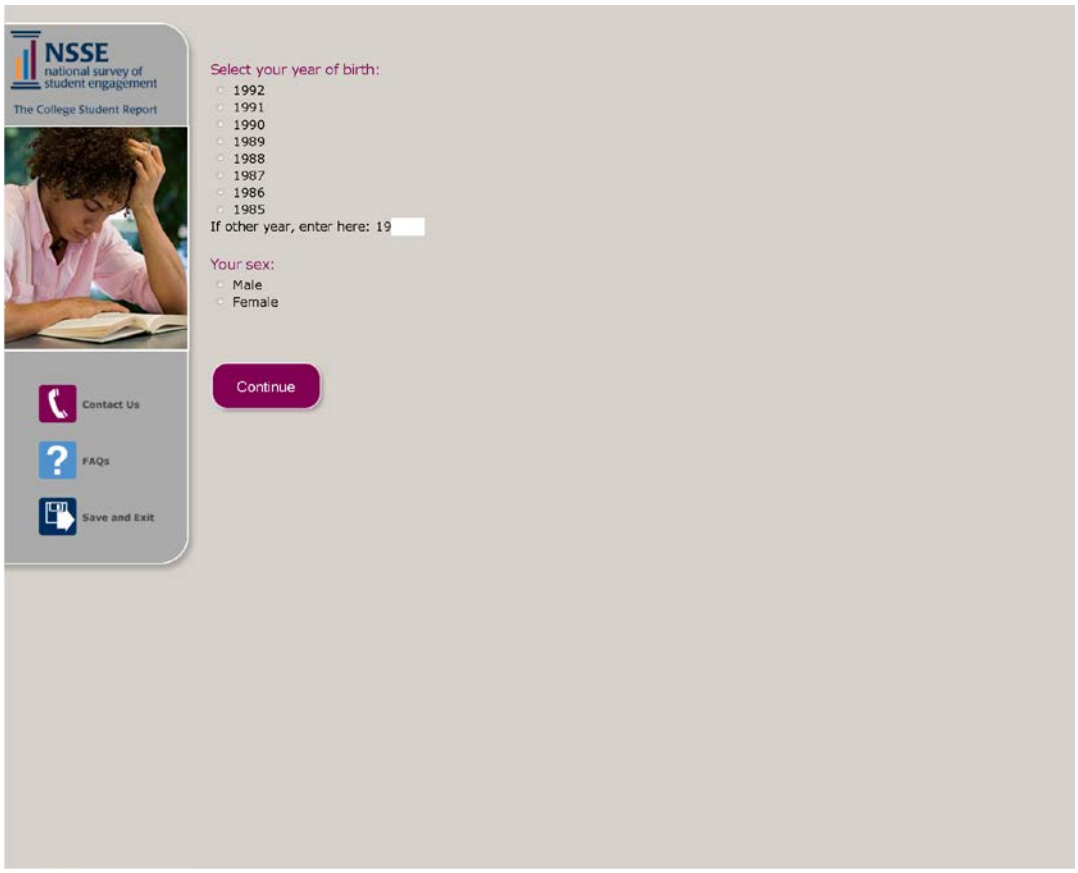
Overall, how would you evaluate the quality of academic advising you have received at your institution?
Excellent
Good
Fair
Poor
How would you evaluate your entire educational experience at this institution?
Excellent
Good
Fair
Poor
If you could start over again, would you go to the same institution you are now attending?
Definitely yes
Probably yes
Probably no
Definitely no
Continue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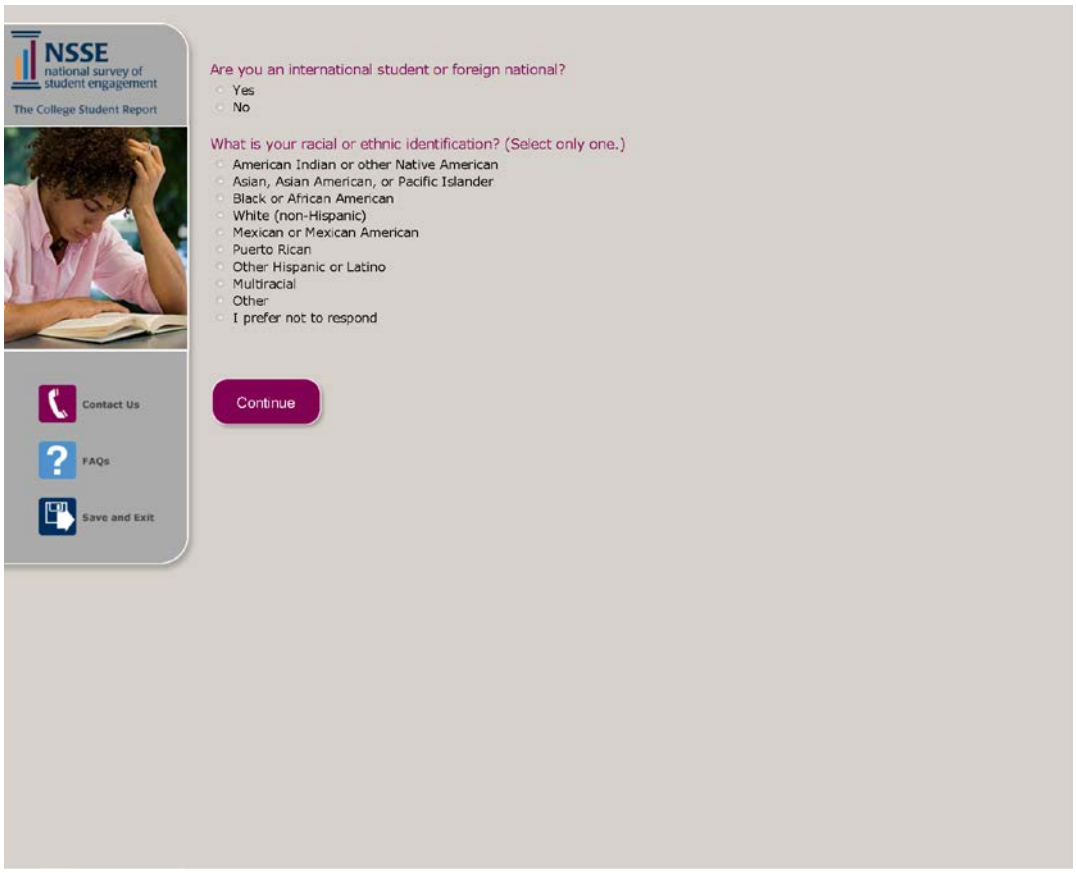
Select your year of birth:
1992
1991
1990
1989
1988
1987
1986
1985
If other year, enter here: 19
Your sex:
Male
Female
Continue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Are you an international student or foreign national?
Yes
No
What is your racial or ethnic identification? (Select only one.)
American Indian or other Native American
Asian, Asian American, or Pacific Islander
Black or African American
White (non-Hispanic)
Mexican or Mexican American
Puerto Rican
Other Hispanic or Latino
Multiracial
Other
I prefer not to respond
Continue

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What is your current classification in college?

- Freshman/first-year
- Sophomore
- Junior
- Senior
- Unclassified

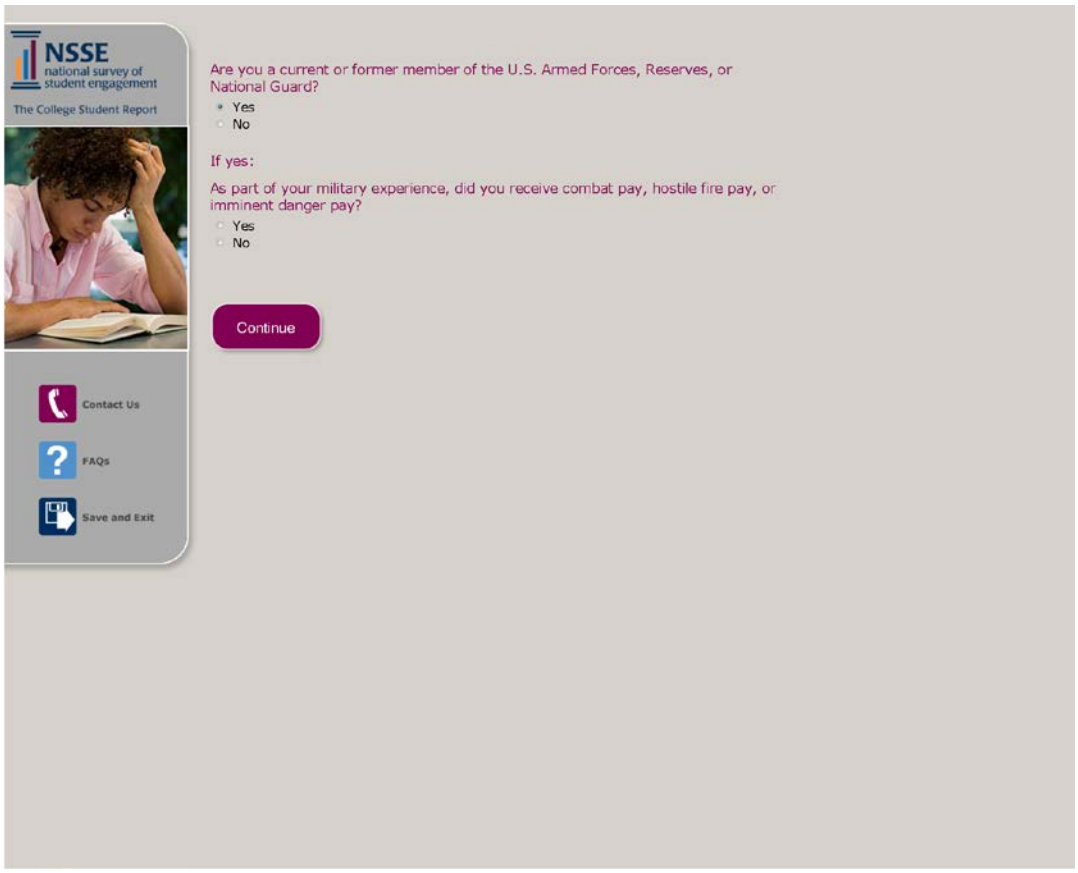
Did you begin college at your current institution or elsewhere?

- Started here
- Started elsewhere

Since graduating from high school, which of the following types of schools have you attended other than the one you are attending now? (Select all that apply.)

- Vocational or technical school
- Community or junior college
- 4-year college other than this one
- None
- Other

Continue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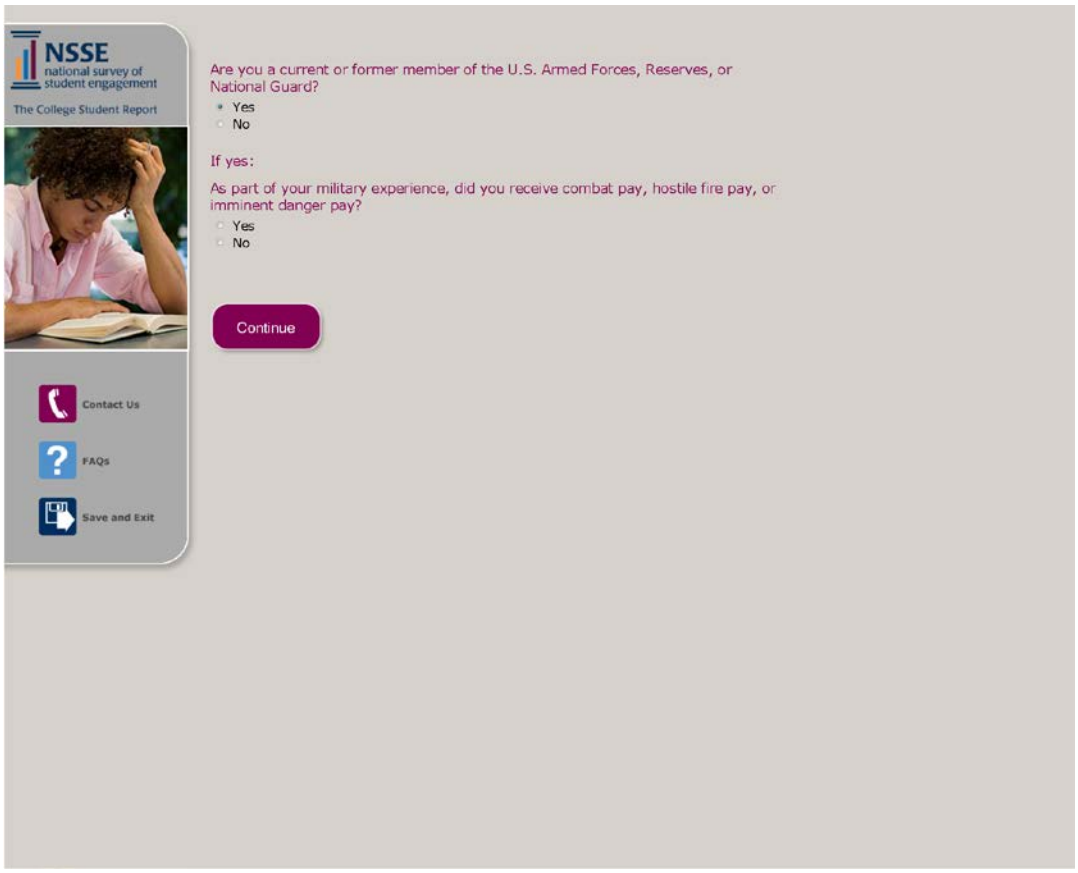
Are you a current or former member of the U.S. Armed Forces, Reserves, or National Guard?
Yes
No
If yes:
As part of your military experience, did you receive combat pay, hostile fire pay, or imminent danger pay?
Yes
No
Continue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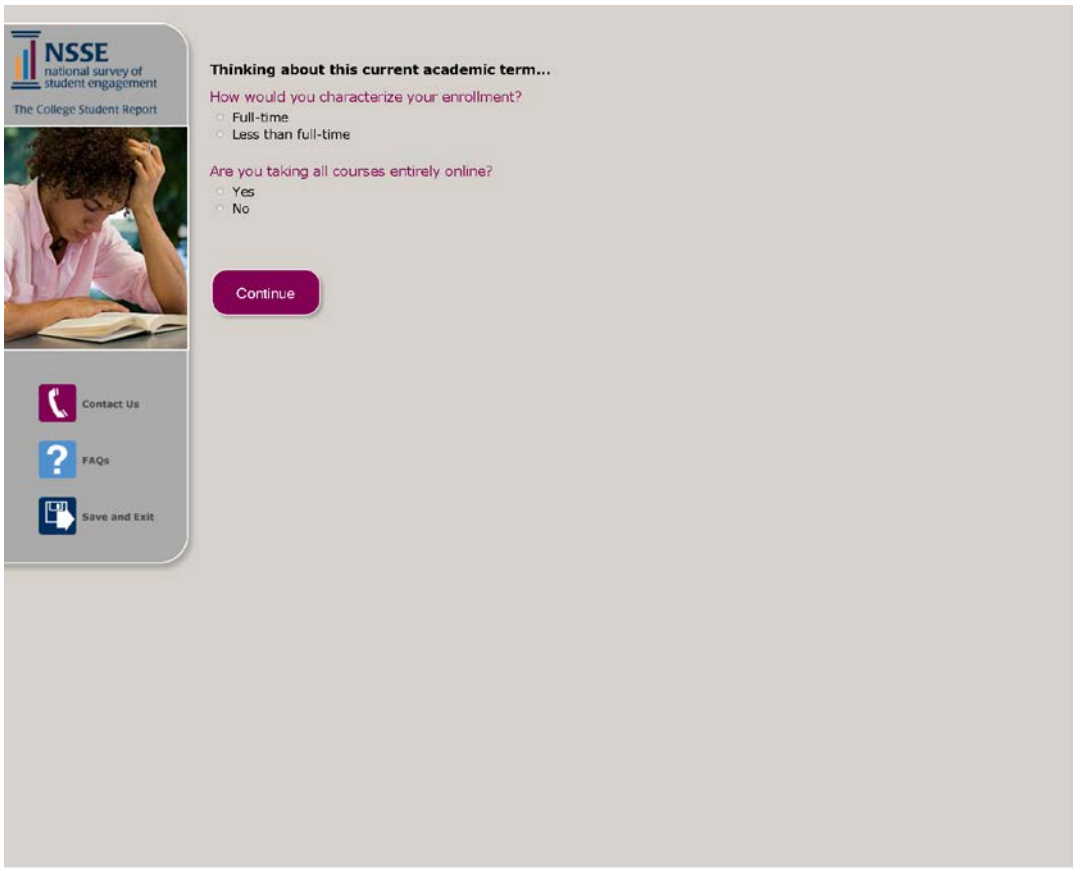
Are you a current or former member of the U.S. Armed Forces, Reserves, or National Guard?
Yes
No
If yes:
As part of your military experience, did you receive combat pay, hostile fire pay, or imminent danger pay?
Yes
No
Continue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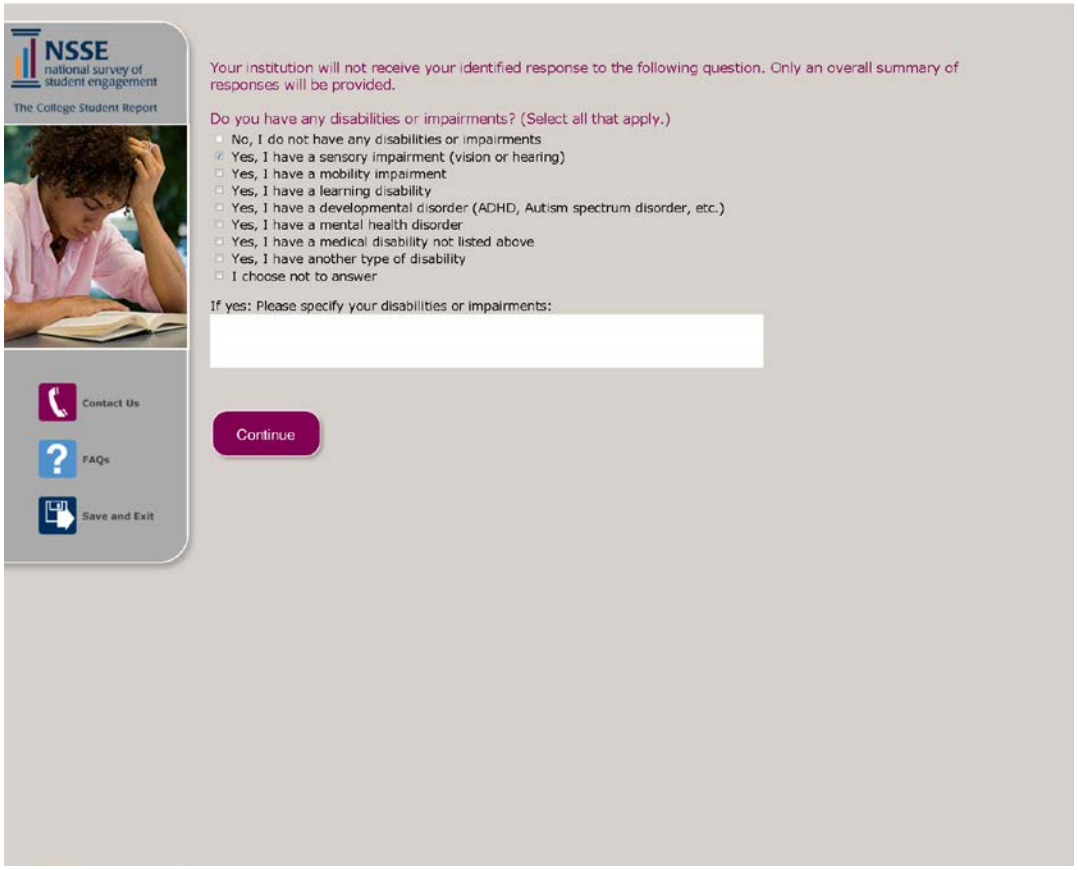
Thinking about this current academic term...
How would you characterize your enrollment?
Full-time
Less than full-time
Are you taking all courses entirely online?
Yes
No
Continue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Your institution will not receive your identified response to the following question. Only an overall summary of responses will be provided.
Do you have any disabilities or impairments? (Select all that apply.)
No, I do not have any disabilities or impairments
Yes, I have a sensory impairment (vision or hearing)
Yes, I have a mobility impairment
Yes, I have a learning disability
Yes, I have a developmental disorder (ADHD, Autism spectrum disorder, etc.)
Yes, I have a mental health disorder
Yes, I have a medical disability not listed above
Yes, I have another type of disability
I choose not to answer
If yes: Please specify your disabilities or impairments:
Continue

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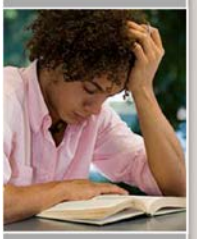

Contact Us

FAQs

Save and Exit

Are you a member of a social fraternity or sorority?

- Yes
- No

Are you a student-athlete on a team sponsored by your institution's athletics department?

- Yes
- No

On what team(s) sponsored by your institution's athletics department are you an athlete? (Select all that apply.)

- Baseball
- Basketball
- Bowling
- Cross Country
- Fencing
- Field Hockey
- Football
- Golf
- Gymnastics
- Ice Hockey
- Track & Field
- Lacrosse
- Rifle
- Rowing
- Skiing
- Soccer
- Softball
- Swimming & Diving
- Tennis
- Volleyball
- Water Polo
- Wrestling
- Other, specify:

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What have most of your grades been up to now at this institution?

- A
- A-
- B+
- B
- B-
- C+
- C
- C- or lower

Which of the following best describes where you are living now while attending college?

- Dormitory or other campus housing (not fraternity/sorority house)
- Residence (house, apartment, etc.) within **walking distance** of the institution
- Residence (house, apartment, etc.) within **driving distance** of the institution
- Fraternity or sorority house
- None of the above

Continue

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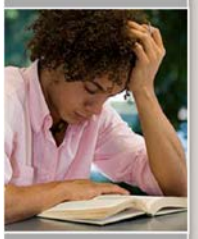

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FAQs

Save and Exit

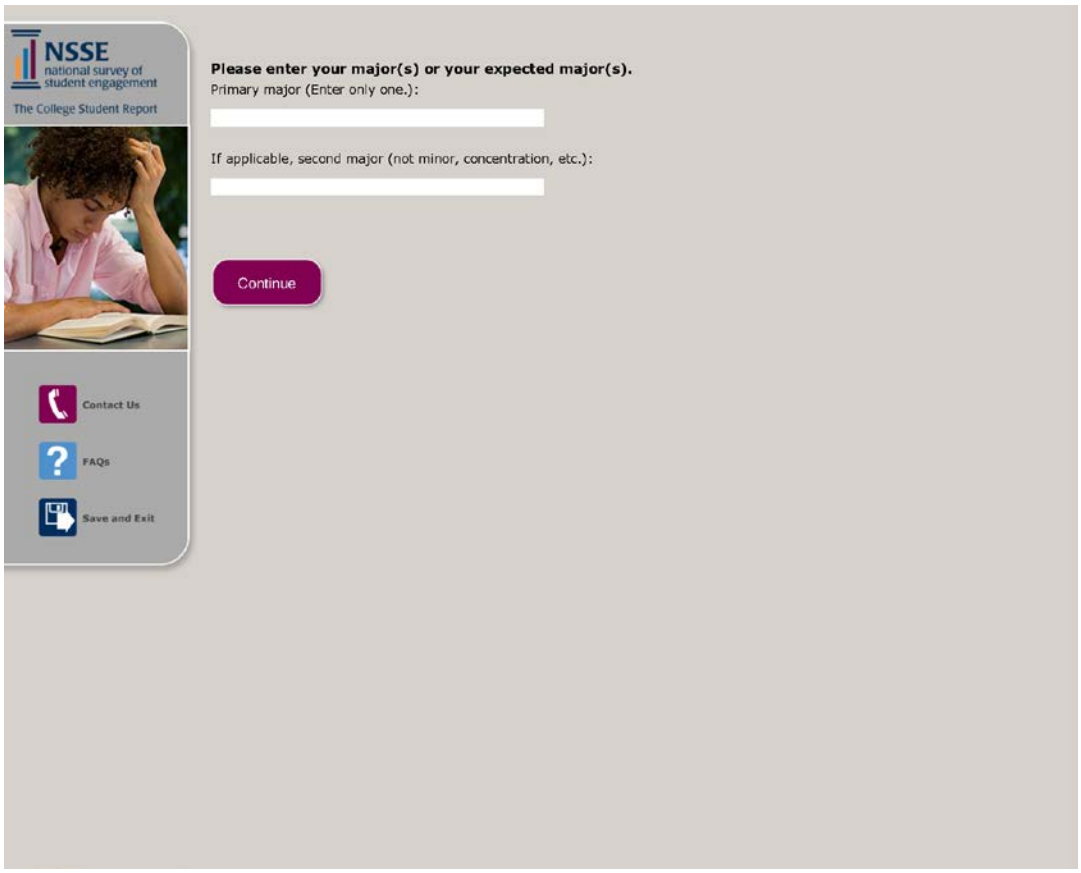
What is the highest level of education that your **father** completed?

- Did not finish high school
- Graduated from high school
- Attended college but did not complete degree
- Completed an associate's degree (A.A., A.S., etc.)
- Completed a bachelor's degree (B.A., B.S., etc.)
- Completed a master's degree (M.A., M.S., etc.)
- Completed a doctoral degree (Ph.D., J.D., M.D., etc.)

What is the highest level of education that your **mother** completed?

- Did not finish high school
- Graduated from high school
- Attended college but did not complete degree
- Completed an associate's degree (A.A., A.S., etc.)
- Completed a bachelor's degree (B.A., B.S., etc.)
- Completed a master's degree (M.A., M.S., etc.)
- Completed a doctoral degree (Ph.D., J.D., M.D., etc.)

Continue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Please enter your major(s) or your expected major(s).
Primary major (Enter only one.):
If applicable, second major (not minor, concentration, etc.):
Continue

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Save and Exit

We're sorry, but we weren't able to identify the primary major you entered.

Please select the response below that most closely matches your **primary** major.

Select from a general area below to view a list of specific majors.

Expand all categories | Contract all categories

Arts & Humanities:
- Art, fine and applied
- English (language and literature)
- History
- Journalism
- Language and literature (except English)
- Music
- Philosophy
- Speech
- Theater or drama
- Theology or religion
- Other arts & humanities

Biological Science:
- Biology (general)
- Biochemistry or biophysics
- Botany
- Environmental science
- Marine (life) science
- Microbiology or bacteriology
- Zoolology
- Other biological science

Business:
- Accounting
- Business administration (general)
- Finance
- International business
- Marketing
- Management
- Other business

Education:
- Business education
- Elementary/middle school education
- Music or art education
- Physical education or recreation
- Secondary education
- Special education
- Other education

Engineering:
- Aero-/astronautical engineering
- Civil engineering
- Chemical engineering
- Electrical or electronic engineering
- Industrial engineering
- Materials engineering
- Mechanical engineering
- General/other engineering

Physical Science:
- Astronomy
- Atmospheric science (including meteorology)
- Chemistry
- Earth science (including geology)
- Mathematics
- Physics
- Statistics
- Other physical science

Professional:
- Architecture
- Urban planning
- Health technology (medical, dental, laboratory)
- Law
- Library/archival science
- Medicine
- Dentistry
- Veterinarian
- Nursing
- Pharmacy
- Allied health/other medical
- Therapy (occupational, physical, speech)
- Other professional

Social Science:
- Anthropology
- Economics
- Ethnic studies
- Geography
- Political science (including government, international relations)
- Psychology
- Social work
- Sociology
- Gender studies
- Other social science

Other:
- Agriculture
- Communications
- Computer science
- Family Studies
- Natural resources and conservation
- Kinesiology
- Criminal justice
- Military science
- Parks, recreation,leisure studies, sports management
- Public administration
- Technical/vocational
- Other field
- Undecided

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Save and Exit

We're sorry, but we weren't able to identify the second major you entered.

Please select the response below that most closely matches your **second** major.

Select from a general area below to view a list of specific majors.

Expand all categories | Contract all categories

Arts & Humanities:
- Art, fine and applied
- English (language and literature)
- History
- Journalism
- Language and literature (except English)
- Music
- Philosophy
- Speech
- Theater or drama
- Theology or religion
- Other arts & humanities

Biological Science:
- Biology (general)
- Biochemistry or biophysics
- Botany
- Environmental science
- Marine (life) science
- Microbiology or bacteriology
- Zoology
- Other biological science

Business:
- Accounting
- Business administration (general)
- Finance
- International business
- Marketing
- Management
- Other business

Education:
- Business education
- Elementary/middle school education
- Music or art education
- Physical education or recreation
- Secondary education
- Special education
- Other education

Engineering:
- Aero-/astronautical engineering
- Civil engineering
- Chemical engineering
- Electrical or electronic engineering
- Industrial engineering
- Materials engineering
- Mechanical engineering
- General/other engineering

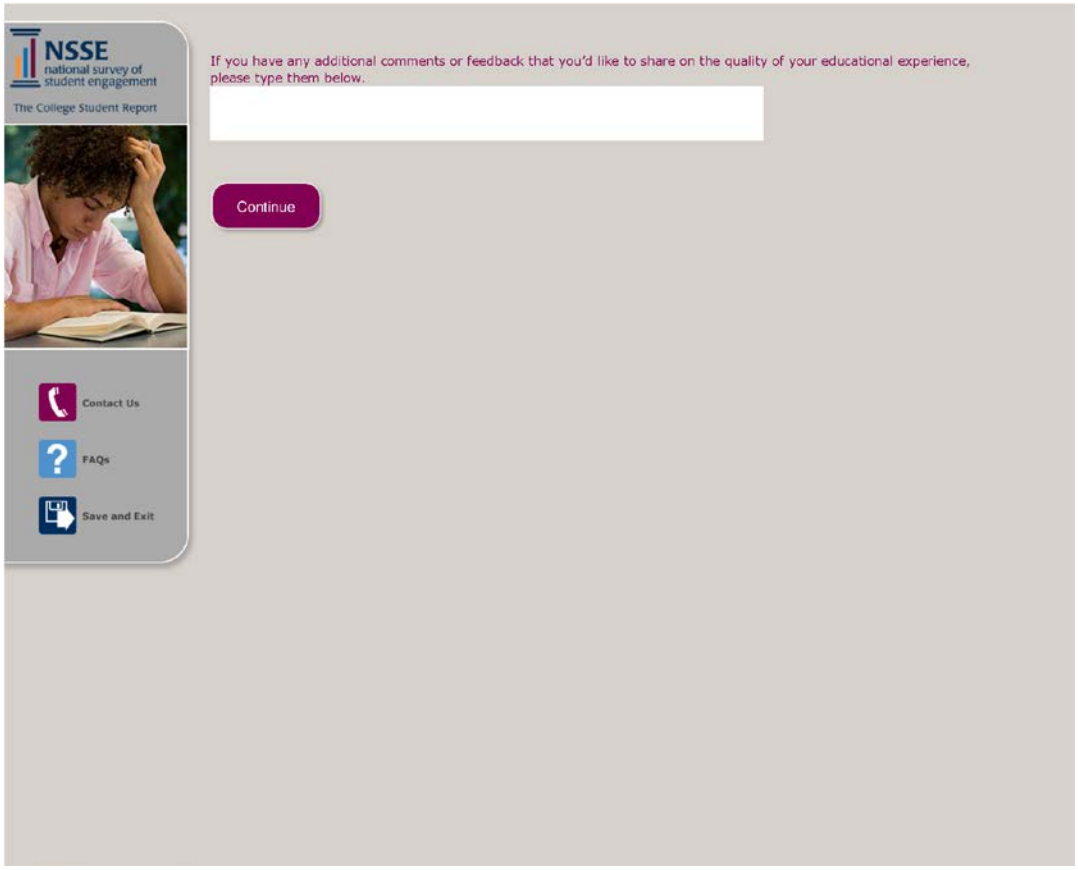
Physical Science:
- Astronomy
- Atmospheric science (including meteorology)
- Chemistry
- Earth science (including geology)
- Mathematics
- Physics
- Statistics
- Other physical science

Professional:
- Architecture
- Urban planning
- Health technology (medical, dental, laboratory)
- Law
- Library/archival science
- Medicine
- Dentistry
- Veterinarian
- Nursing
- Pharmacy
- Allied health/other medical
- Therapy (occupational, physical, speech)
- Other professional

Social Science:
- Anthropology
- Economics
- Ethnic studies
- Geography
- Political science (including government, international relations)
- Psychology
- Social work
- Sociology
- Gender studies
- Other social science

Other:
- Agriculture
- Communications
- Computer science
- Family Studies
- Natural resources and conservation
- Kinesiology
- Criminal justice
- Military science
- Parks, recreation, leisure studies, sports management
- Public administration
- Technical/vocational
- Other field
- Undecided

Continue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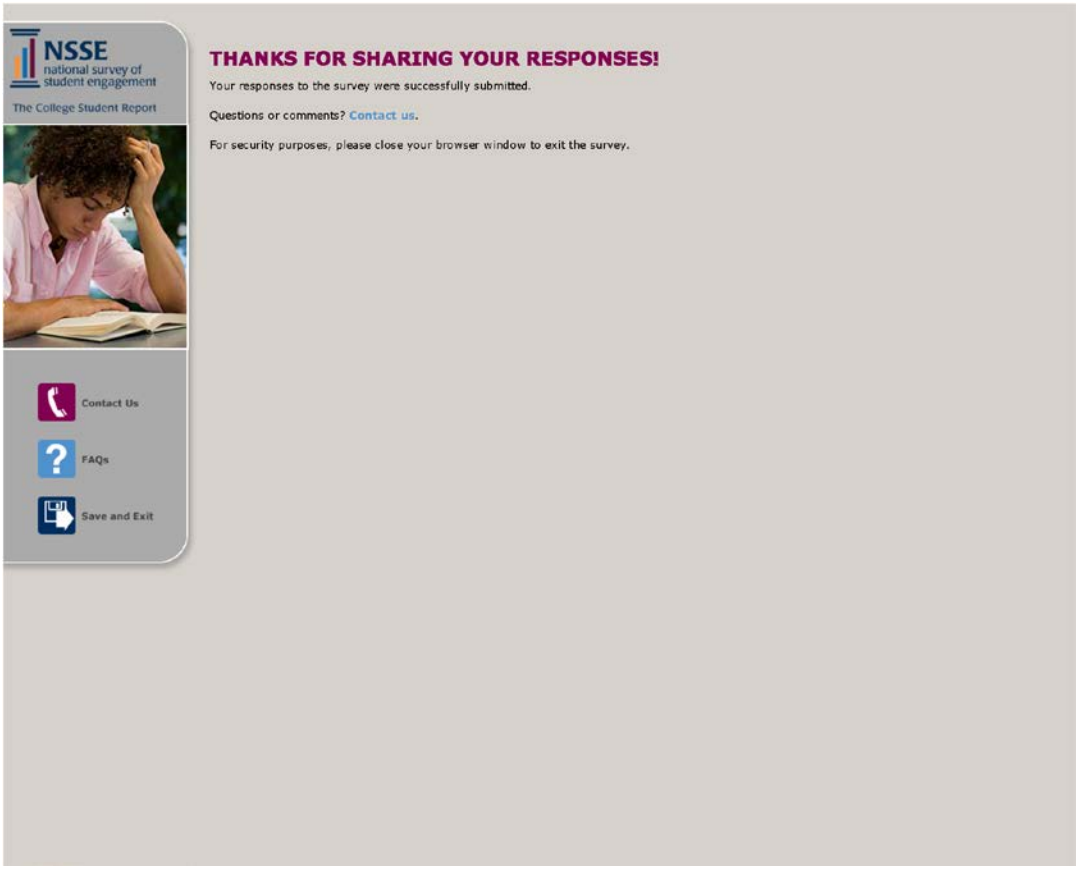
If you have any additional comments or feedback that you'd like to share on the quality of your educational experience, please type them below.
Continue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THANKS FOR SHARING YOUR RESPONSES!
Your responses to the survey were successfully submitted.
Questions or comments? Contact us.
For security purposes, please close your browser window to exit the survey.

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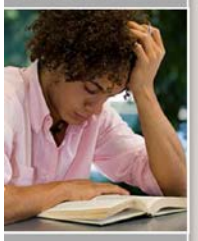

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For technical questions regarding the survey:

E-mail: help@nssesurvey.org
Phone: 1-800-676-0390
Mail: Center for Survey Research
Indiana University
Eigenmann Hall 2 South
1900 E. 10th Street
Bloomington, IN 47406-7512
USA
Link: Center for Survey Research Home Page

For general NSSE issues:

E-mail: nsse@indiana.edu
Mail: Center for Postsecondary Research
Indiana University Bloomington
1900 East 10th Street
Eigenmann Hall Suite 419
Bloomington, IN 47406-7512
Link: The National Survey of Student Engagement

Appendix D

Response Options to Question 1 by Gender

Response Frequencies

		Male		Female	
Question	Response options	Frequency	Percent	Frequency	Percent
a. Overall Internet use	Less often or never	1	0.1%	6	0.4%
	Every few weeks	0	0.0%	6	0.4%
	1-2 days a week	14	1.4%	25	1.7%
	3-5 days a week	68	6.9%	78	5.2%
	About once a day	186	18.9%	251	16.8%
	Several times a day	717	72.7%	1127	75.5%
	Total	986	100.0%	1493	100.0%
b. Daily Internet use	Less than 1 hour	63	6.4%	77	5.2%
	1 to 2 hours	248	25.2%	335	22.5%
	2 to 3 hours	217	22.0%	360	24.2%
	3 to 4 hours	167	16.9%	260	17.4%
	4 to 5 hours	112	11.4%	193	13.0%
	5 to 6 hours	81	8.2%	108	7.2%
	6 to 7 hours	28	2.8%	64	4.3%
	7 hours or more	70	7.1%	93	6.2%
	Total	986	100.0%	1490	100.0%
c. Filtered	I did not use a computer to access the Internet at all	3	0.3%	2	0.1%
	No, I could only connect to a few websites	15	1.5%	28	1.9%
	No, but I could connect to most websites	162	16.5%	238	16.0%
	Yes, but I could connect to all websites	718	73.2%	1055	71.0%
	I do not know	83	8.5%	162	10.9%
	Total	981	100.0%	1485	100.0%

Question	Response options	Male		Female	
		Frequency	Percent	Frequency	Percent
d. Monitored	I did not use a computer to access the Internet at all	2	0.2%	0	0.0%
	Yes, I was always supervised	18	1.8%	21	1.4%
	Yes, I was sometimes supervised	237	24.1%	357	24.0%
	No, I was always unsupervised	704	71.5%	1081	72.7%
	I do not know	24	2.4%	28	1.9%
	Total	985	100.0%	1487	100.0%
e. Own computer	I did not use a computer to access the Internet at all	1	0.1%	2	0.1%
	No, the computer did not belong to me or my family	38	3.9%	46	3.1%
	Yes, the computer belonged to my family	396	40.3%	604	40.5%
	Yes, the computer belonged just to me	547	55.7%	838	56.2%
	Total	982	100.0%	1490	100.0%
f. Multiple computers	I did not use a computer to access the Internet at all	3	0.3%	2	0.1%
	No, I only used one computer	267	27.2%	479	32.2%
	Yes, I used multiple computers	713	72.5%	1005	67.6%
	Total	983	100.0%	1486	100.0%
g. Handheld mobile device	Never	252	25.7%	416	27.9%
	Several times a month	28	2.9%	57	3.8%
	Once or twice a week	45	4.6%	59	4.0%
	Several times a week	48	4.9%	46	3.1%
	Once or twice a day	120	12.2%	149	10.0%
	Several times a day	489	49.8%	764	51.2%
	Total	982	100.0%	1491	100.0%
h. Other device	I did not access the Internet at all	20	2.0%	26	1.8%
	No, I only accessed the Internet using a computer or mobile device	562	57.3%	1170	78.8%
	Yes, I accessed the Internet using other devices	399	40.7%	289	19.5%
	Total	981	100.0%	1485	100.0%

Descriptive Statistics

Question	Gender	N	Minimum	Maximum	Mean	Std. Deviation
a. Overall Internet use	Male	1172	1	6	5.6	0.7
	Female	1732	1	6	5.6	0.8
b. Daily Internet use	Male	1170	1	8	3.8	1.9
	Female	1729	1	8	3.8	1.8
c. Filtered	Male	1068	1	4	3.8	0.5
	Female	1532	1	4	3.8	0.5
d. Monitored	Male	1138	1	4	3.7	0.5
	Female	1691	1	4	3.7	0.5
e. Own computer	Male	1163	1	4	3.5	0.6
	Female	1729	1	4	3.5	0.6
f. Multiple computers	Male	1164	1	3	2.7	0.5
	Female	1724	1	3	2.7	0.5
g. Handheld mobile device	Male	1164	1	6	4.3	2.1
	Female	1730	1	6	4.2	2.2
h. Other device	Male	1161	1	3	2.4	0.5
	Female	1724	1	3	2.2	0.4

Independent Sample T-Tests

						95% Confidence Interval of the Difference	
Question	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
a. Overall Internet use	-0.42	2902.00	0.67	-0.01	0.03	-0.07	0.04
b. Daily Internet use	-0.52	2897.00	0.61	-0.04	0.07	-0.18	0.10
c. Filtered	0.38	2598.00	0.71	0.01	0.02	-0.03	0.05
d. Monitored	-0.44	2827.00	0.66	-0.01	0.02	-0.05	0.03
e. Own computer	-0.67	2890.00	0.50	-0.01	0.02	-0.06	0.03
f. Multiple computers	3.01	2567.79	0.00	0.05	0.02	0.02	0.09
g. Handheld mobile device	0.88	2546.08	0.38	0.07	0.08	-0.09	0.23

h. Other device	11.74	2138.78	0.00	0.22	0.02	0.18	0.25

Appendix E

Frequencies of Response Options by Detailed Race/Ethnicity Groups

Question 1a. Overall Internet Use

		Amer. Indian	Asian Amer.	Black	White	Hisp./ Latino	Multiracial	Other/no answer
Less often or never	Frequency	0	0	2	5	1	1	0
	Percentage	0.0%	0.0%	0.3%	0.3%	1.0%	0.9%	0.0%
Every few weeks	Frequency	0	0	3	4	1	1	0
	Percentage	0.0%	0.0%	0.4%	0.2%	1.0%	0.9%	0.0%
1-2 days a week	Frequency	1	2	11	29	2	1	2
	Percentage	5.3%	1.8%	1.6%	1.7%	1.9%	0.9%	1.2%
3-5 days a week	Frequency	2	4	68	87	8	5	17
	Percentage	10.5%	3.7%	9.9%	5.1%	7.6%	4.3%	9.8%
About once a day	Frequency	4	16	92	325	19	17	41
	Percentage	21.1%	14.7%	13.4%	19.0%	18.1%	14.5%	23.7%
Several times a day	Frequency	12	87	510	1264	74	92	113
	Percentage	63.2%	79.8%	74.3%	73.7%	70.5%	78.6%	65.3%
Total	Frequency	19	109	686	1714	105	117	173
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 1b. Daily Internet Use

		Amer. Indian	Asian Amer.	Black	White	Hisp./ Latino	Multiracial	Other/no answer
Less than 1 hour	Frequency	2	4	16	121	7	4	12
	Percentage	10.5%	3.7%	2.3%	7.1%	6.7%	3.4%	7.0%
1 to 2 hours	Frequency	3	18	81	486	22	18	39
	Percentage	15.8%	16.7%	11.8%	28.4%	21.0%	15.4%	22.7%
2 to 3 hours	Frequency	1	21	128	451	21	27	39
	Percentage	5.3%	19.4%	18.7%	26.4%	20.0%	23.1%	22.7%
3 to 4 hours	Frequency	3	14	128	267	23	28	32
	Percentage	15.8%	13.0%	18.7%	15.6%	21.9%	23.9%	18.6%
4 to 5 hours	Frequency	1	16	120	180	14	10	15
	Percentage	5.3%	14.8%	17.5%	10.5%	13.3%	8.5%	8.7%
5 to 6 hours	Frequency	7	7	76	114	11	12	11
	Percentage	36.8%	6.5%	11.1%	6.7%	10.5%	10.3%	6.4%
6 to 7 hours	Frequency	0	11	39	38	1	9	8
	Percentage	0.0%	10.2%	5.7%	2.2%	1.0%	7.7%	4.7%
7 hours or more	Frequency	2	17	98	54	6	9	16
	Percentage	10.5%	15.7%	14.3%	3.2%	5.7%	7.7%	9.3%
Total	Frequency	19	108	686	1711	105	117	172
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 1c. Filtered

		Amer. Indian	Asian Amer.	Black	White	Hisp./ Latino	Multiracial	Other/ no answer
I did not use a computer to access the Internet at all	Frequency	0	0	1	3	1	1	2
	Percentage	0.0%	0.0%	0.1%	0.2%	1.0%	0.9%	1.2%
No, I could only connect to a few websites	Frequency	0	2	15	24	2	4	2
	Percentage	0.0%	1.9%	2.2%	1.4%	2.0%	3.4%	1.2%
No, but I could connect to most websites	Frequency	2	19	111	275	17	19	25
	Percentage	10.5%	17.6%	16.2 %	16.1%	16.7%	16.4%	14.7%
Yes, but I could connect to all websites	Frequency	15	77	507	1224	70	84	115
	Percentage	78.9%	71.3%	74.1 %	71.7%	68.6%	72.4%	67.6%
I do not know	Frequency	2	10	50	180	12	8	26
	Percentage	10.5%	9.3%	7.3%	10.6%	11.8%	6.9%	15.3%
Total	Frequency	19	108	684	1706	102	116	170
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 1d. Monitored

		Amer. Indian	Asian Amer.	Black	White	Hisp./ Latino	Multiracial	Other/ no answer
I did not use a computer to access the Internet at all	Frequency	0	0	2	1	0	1	1
	Percentage	0.0%	0.0%	0.3%	0.1%	0.0%	0.9%	0.6%
Yes, I was always supervised	Frequency	1	3	13	21	0	1	3
	Percentage	5.3%	2.8%	1.9%	1.2%	0.0%	0.9%	1.7%
Yes, I was sometimes supervised	Frequency	1	21	145	452	18	19	28
	Percentage	5.3%	19.3%	21.2%	26.5%	17.5%	16.4%	16.2%
No, I was always unsupervised	Frequency	17	82	513	1197	81	93	134
	Percentage	89.5%	75.2%	74.9%	70.1%	78.6%	80.2%	77.5%
I do not know	Frequency	0	3	12	37	4	2	7
	Percentage	0.0%	2.8%	1.8%	2.2%	3.9%	1.7%	4.0%
Total	Frequency	19	109	685	1708	103	116	173
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 1e. Own Computer

		Amer. Indian	Asian Amer.	Black	White	Hisp. /Latino	Multiracial	Other/ no answer
I did not use a computer to access the Internet at all	Frequency	0	0	1	2	0	0	1
	Percentage	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.6%
No, the computer did not belong to me or my family	Frequency	2	1	33	51	1	6	4
	Percentage	10.5%	0.9%	4.8%	3.0%	1.0%	5.1%	2.4%
Yes, the computer belonged to my family	Frequency	7	35	254	730	37	39	60
	Percentage	36.8%	32.4%	37.1%	42.7%	35.6%	33.3%	35.3%
Yes, the computer belonged just to me	Frequency	10	72	397	925	66	72	105
	Percentage	52.6%	66.7%	58.0%	54.2%	63.5%	61.5%	61.8%
Total	Frequency	19	108	685	1708	104	117	170
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 1f. Multiple Computers

		Amer. Indian	Asian Amer.	Black	White	Hisp. /Latino	Multi-racial	Other/ no answer
I did not use a computer to access the Internet at all	Frequency	0	0	0	4	0	1	3
	Percentage	0.0%	0.0%	0.0%	0.2%	0.0%	0.9%	1.8%
No, I only used one computer	Frequency	7	27	219	501	33	32	50
	Percentage	36.8%	25.0%	32.1%	29.3%	31.7%	27.4%	29.6%
Yes, I used multiple computers	Frequency	12	81	463	1203	71	84	116
	Percentage	63.2%	75.0%	67.9%	70.4%	68.3%	71.8%	68.6%
Total	Frequency	19	108	682	1708	104	117	169
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 1g. Handheld Mobile Device

		Amer. Indian	Asian Amer.	Black	White	Hisp./ Latino	Multiracial	Other/ no answer
Never	Frequency	4	18	74	574	23	21	57
	Percentage	21.1%	16.7%	10.8%	33.6%	21.9%	17.9%	33.5%
Several times a month	Frequency	2	5	14	71	2	1	6
	Percentage	10.5%	4.6%	2.0%	4.2%	1.9%	0.9%	3.5%
Once or twice a week	Frequency	0	7	28	71	4	7	8
	Percentage	0.0%	6.5%	4.1%	4.2%	3.8%	6.0%	4.7%
Several times a week	Frequency	0	7	22	69	4	8	2
	Percentage	0.0%	6.5%	3.2%	4.0%	3.8%	6.8%	1.2%
Once or twice a day	Frequency	2	19	51	197	14	12	15
	Percentage	10.5%	17.6%	7.4%	11.5%	13.3%	10.3%	8.8%
Several times a day	Frequency	11	52	496	727	58	68	82
	Percentage	57.9%	48.1%	72.4%	42.5%	55.2%	58.1%	48.2%
Total	Frequency	19	108	685	1709	105	117	170
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 1h. Other Device

		Amer. Indian	Asian Amer.	Black	White	Hisp. /Latino	Multiracial	Other/ no answer
I did not access the Internet at all	Frequency	0	3	7	32	2	1	5
	Percentage	0.0%	2.8%	1.0%	1.9%	1.9%	0.9%	2.9%
No, I only accessed the Internet using a computer or mobile device	Frequency	13	68	442	1247	62	76	110
	Percentage	68.4%	63.0 %	64.8%	73.1%	60.2%	66.1%	64.7%
Yes, I accessed the Internet using other devices	Frequency	6	37	233	428	39	38	55
	Percentage	31.6%	34.3 %	34.2%	25.1%	37.9%	33.0%	32.4%
Total	Frequency	19	108	682	1707	103	115	170
	Percentage	100%	100%	100%	100%	100%	100%	100%

Question 2

		Amer. Indian	Asian Amer.	Black	White	Hisp. /Latino	Multiracial	Other/ no answer
a. Use own computer	Frequency	18	101	629	1668	97	106	160
	Percentage	94.7%	91.8%	90.8%	96.4%	92.4%	89.8%	87.9%
b. Use family computer	Frequency	1	13	50	78	4	4	10
	Percentage	5.3%	11.8%	7.2%	4.5%	3.8%	3.4%	5.5%
c. Use another's computer	Frequency	0	8	59	79	6	9	7
	Percentage	0.0%	7.3%	8.5%	4.6%	5.7%	7.6%	3.8%
d. Use campus computers	Frequency	3	31	203	409	29	31	44
	Percentage	15.8%	28.2%	29.3%	23.6%	27.6%	26.3%	24.2%
e. Use something else	Frequency	1	18	111	276	18	14	15
	Percentage	5.3%	16.4%	16.0%	15.9%	17.1%	11.9%	8.2%
f. Use nothing	Frequency	0	0	1	0	0	0	0
	Percentage	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
g. Use unknown	Frequency	1	2	15	11	0	3	5
	Percentage	5.3%	1.8%	2.2%	0.6%	0.0%	2.5%	2.7%

Appendix F

Descriptive Statistics of Question 1 for Combined Racial/Ethnic Groups

Question	Race/ethnicity	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound
a. Overall Internet use	White	1714	5.63	0.722	0.017	5.6	5.67
	Black	686	5.59	0.805	0.031	5.53	5.65
	Hispanic/Latino	105	5.52	0.91	0.089	5.35	5.7
	Other	418	5.61	0.731	0.036	5.54	5.69
	Total	2923	5.62	0.751	0.014	5.59	5.64
b. Daily Internet use	White	1711	3.39	1.655	0.04	3.31	3.47
	Black	686	4.65	1.968	0.075	4.5	4.79
	Hispanic/Latino	105	3.78	1.781	0.174	3.44	4.13
	Other	416	4.16	2.044	0.1	3.96	4.36
	Total	2918	3.81	1.873	0.035	3.74	3.88
c. Filtered	White	1526	3.78	0.462	0.012	3.76	3.81
	Black	634	3.77	0.482	0.019	3.74	3.81
	Hispanic/Latino	90	3.73	0.557	0.059	3.62	3.85
	Other	367	3.75	0.528	0.028	3.7	3.81
	Total	2617	3.77	0.48	0.009	3.76	3.79
d. Monitored	White	1671	3.7	0.488	0.012	3.68	3.73
	Black	673	3.74	0.501	0.019	3.7	3.77
	Hispanic/Latino	99	3.82	0.388	0.039	3.74	3.9
	Other	405	3.78	0.494	0.025	3.73	3.82
	Total	2848	3.73	0.489	0.009	3.71	3.74
e. Own computer	White	1708	3.51	0.563	0.014	3.48	3.54
	Black	685	3.53	0.596	0.023	3.48	3.57
	Hispanic/Latino	104	3.63	0.506	0.05	3.53	3.72
	Other	414	3.59	0.566	0.028	3.53	3.64
	Total	2911	3.53	0.57	0.011	3.51	3.55
f. Multiple computers	White	1708	2.7	0.463	0.011	2.68	2.72
	Black	682	2.68	0.467	0.018	2.64	2.71
	Hispanic/Latino	104	2.68	0.468	0.046	2.59	2.77
	Other	413	2.7	0.48	0.024	2.65	2.75
	Total	2907	2.7	0.466	0.009	2.68	2.71

Question	Race/ethnicity	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound
g. Handheld mobile device	White	1709	3.83	2.241	0.054	3.73	3.94
	Black	685	5.12	1.68	0.064	4.99	5.24
	Hispanic/Latino	105	4.5	2.053	0.2	4.11	4.9
	Other	414	4.3	2.111	0.104	4.1	4.5
	Total	2913	4.23	2.162	0.04	4.15	4.3
h. Other device	White	1707	2.23	0.465	0.011	2.21	2.25
	Black	682	2.33	0.492	0.019	2.29	2.37
	Hispanic/Latino	103	2.36	0.521	0.051	2.26	2.46
	Other	412	2.31	0.507	0.025	2.26	2.36
	Total	2904	2.27	0.482	0.009	2.25	2.29

Appendix G

Response Options to Question 1 by First-gen Status

Frequencies of Response Options

		First-generation Student		Non-first-generation Student	
Question	Response options	Frequency	Percent	Frequency	Percent
a. Overall Internet use	Less often or never	4	0.2%	4	0.5%
	Every few weeks	2	0.1%	6	0.7%
	1-2 days a week	25	1.3%	21	2.5%
	3-5 days a week	103	5.2%	73	8.7%
	About once a day	343	17.4%	153	18.3%
	Several times a day	1490	75.7%	581	69.3%
	Total	1967	100.0%	838	100.0 %
b. Daily Internet use	Less than 1 hour	106	5.4%	52	6.2%
	1 to 2 hours	471	24.0%	180	21.5%
	2 to 3 hours	476	24.2%	188	22.5%
	3 to 4 hours	338	17.2%	139	16.6%
	4 to 5 hours	234	11.9%	105	12.5%
	5 to 6 hours	158	8.0%	66	7.9%
	6 to 7 hours	69	3.5%	31	3.7%
	7 hours or more	111	5.7%	76	9.1%
	Total	1963	100.0%	837	100.0 %
c. Filtered	I did not use a computer to access the Internet at all	1	0.1%	5	0.6%
	No, I could only connect to a few websites	24	1.2%	19	2.3%
	No, but I could connect to most websites	320	16.4%	131	15.7%
	Yes, but I could connect to all websites	1422	72.8%	590	70.7%
	I do not know	187	9.6%	89	10.7%
	Total	1954	100.0%	834	100.0 %

Question	Response options	First-generation Student		Non-first-generation Student	
		Frequency	Percent	Frequency	Percent
d. Monitored	I did not use a computer to access the Internet at all	1	0.1%	4	0.5%
	Yes, I was always supervised	30	1.5%	9	1.1%
	Yes, I was sometimes supervised	483	24.6%	177	21.2%
	No, I was always unsupervised	1402	71.5%	632	75.7%
	I do not know	44	2.2%	13	1.6%
	Total	1960	100.0%	835	100.0%
e. Own computer	I did not use a computer to access the Internet at all	3	0.2%	1	0.1%
	No, the computer did not belong to me or my family	48	2.5%	41	4.9%
	Yes, the computer belonged to my family	791	40.4%	331	39.6%
	Yes, the computer belonged just to me	1117	57.0%	462	55.3%
	Total	1959	100.0%	835	100.0%
f. Multiple computers	I did not use a computer to access the Internet at all	5	0.3%	2	0.2%
	No, I only used one computer	565	28.9%	263	31.6%
	Yes, I used multiple computers	1388	70.9%	567	68.1%
	Total	1958	100.0%	832	100.0%
g. Handheld mobile device	Never	553	28.2%	197	23.6%
	Several times a month	75	3.8%	20	2.4%
	Once or twice a week	89	4.5%	36	4.3%
	Several times a week	83	4.2%	29	3.5%
	Once or twice a day	215	11.0%	83	9.9%
	Several times a day	946	48.2%	470	56.3%
	Total	1961	100.0%	835	100.0%

Question	Response options	First-generation Student		Non-first-generation Student	
		Frequency	Percent	Frequency	Percent
h. Other device	I did not access the Internet at all	28	1.4%	19	2.3%
	No, I only accessed the Internet using a computer or mobile device	1367	70.0%	589	70.7%
	Yes, I accessed the Internet using other devices	559	28.6%	225	27.0%
	Total	1954	100.0%	833	100.0%

Descriptive Statistics

Question	First-gen status	N	Minimum	Maximum	Mean	Std. Deviation
a. Overall Internet use	First-gen	1967	1	6	5.7	0.7
	Non-first gen	838	1	6	5.5	0.9
b. Daily Internet use	First-gen	1963	1	8	3.7	1.8
	Non-first gen	837	1	8	3.9	2.0
c. Filtered	First-gen	1767	1	4	3.8	0.4
	Non-first gen	745	1	4	3.8	0.5
d. Monitored	First-gen	1916	1	4	3.7	0.5
	Non-first gen	822	1	4	3.8	0.5
e. Own computer	First-gen	1959	1	4	3.5	0.6
	Non-first gen	835	1	4	3.5	0.6
f. Multiple computers	First-gen	1958	1	3	2.7	0.5
	Non-first gen	832	1	3	2.7	0.5
g. Handheld mobile device	First-gen	1961	1	6	4.1	2.2
	Non-first gen	835	1	6	4.4	2.1
h. Other device	First-gen	1954	1	3	2.3	0.5
	Non-first gen	833	1	3	2.3	0.5

Independent Sample T-Tests

Question	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
a. Overall Internet use	4.54	1285.59	0.00	0.15	0.03	0.09	0.22
b. Daily Internet use	-2.38	1467.56	0.02	-0.19	0.08	-0.35	-0.03
c. Filtered	1.68	1209.05	0.09	0.04	0.02	-0.01	0.08
d. Monitored	-1.63	1549.63	0.10	-0.03	0.02	-0.07	0.01
e. Own computer	1.69	1474.28	0.09	0.04	0.02	-0.01	0.09
f. Multiple computers	1.40	1533.91	0.16	0.03	0.02	-0.01	0.07
g. Handheld mobile device	-3.63	1626.74	0.00	-0.32	0.09	-0.49	-0.15
h. Other device	1.24	2785.00	0.22	0.02	0.02	-0.01	0.06

Appendix H

Descriptive Statistics of 3-cluster K-means Cluster Analysis

Unstandardized Descriptive Statistics

Question	Group	N	Minimum	Maximum	Mean	Std. Deviation
a. Overall Internet use	All	2923	1	6	5.6	0.8
	1	1550	4	6	5.9	0.3
	2	663	4	6	5.8	0.4
	3	349	1	5	4.2	0.9
b. Daily Internet use	All	2918	1	8	3.8	1.9
	1	1550	1	8	4.3	1.9
	2	663	1	8	3.5	1.6
	3	349	1	8	2.5	1.3
c. Filtered	All	2617	1	4	3.8	0.5
	1	1550	2	4	3.9	0.3
	2	663	1	4	3.6	0.6
	3	349	1	4	3.6	0.7
d. Monitored	All	2848	1	4	3.7	0.5
	1	1550	3	4	3.9	0.2
	2	663	1	4	3.2	0.5
	3	349	1	4	3.7	0.5
e. Own computer	All	2911	1	4	3.5	0.6
	1	1550	2	4	3.8	0.4
	2	663	1	4	3.2	0.6
	3	349	1	4	3.1	0.6
f. Multiple computers	All	2907	1	3	2.7	0.5
	1	1550	2	3	2.7	0.5
	2	663	2	3	2.9	0.4
	3	349	1	3	2.6	0.5
g. Handheld mobile device	All	2913	1	6	4.2	2.2
	1	1550	1	6	4.8	1.9
	2	663	1	6	3.3	2.3
	3	349	1	6	3.8	2.2
h. Other device	All	2904	1	3	2.3	0.5
	1	1550	1	3	2.4	0.5
	2	663	1	3	2.1	0.4
	3	349	1	3	2.2	0.5

Standardized Descriptive Statistics

Question	Group	N	Minimum	Maximum	Mean	Std. Deviation
a. Overall Internet use	1	1550	-2.15	0.51	0.34	0.46
	2	663	-2.15	0.51	0.29	0.51
	3	349	-6.15	-0.82	-1.91	1.16
b. Daily Internet use	1	1550	-1.50	2.24	0.27	1.03
	2	663	-1.50	2.24	-0.15	0.84
	3	349	-1.50	2.24	-0.72	0.71
c. Filtered	1	1550	-3.70	0.47	0.25	0.67
	2	663	-5.78	0.47	-0.34	1.18
	3	349	-5.78	0.47	-0.38	1.39
d. Monitored	1	1550	-1.48	0.56	0.44	0.49
	2	663	-5.57	0.56	-1.04	1.10
	3	349	-5.57	0.56	0.01	1.03
e. Own computer	1	1550	-2.68	0.83	0.41	0.76
	2	663	-4.44	0.83	-0.52	0.97
	3	349	-4.44	0.83	-0.77	1.03
f. Multiple computers	1	1550	-1.49	0.65	-0.08	1.02
	2	663	-1.49	0.65	0.35	0.75
	3	349	-3.64	0.65	-0.16	1.10
g. Handheld mobile device	1	1550	-1.49	0.82	0.26	0.87
	2	663	-1.49	0.82	-0.43	1.06
	3	349	-1.49	0.82	-0.22	1.03
h. Other device	1	1550	-2.64	1.51	0.20	1.04
	2	663	-2.64	1.51	-0.26	0.84
	3	349	-2.64	1.51	-0.26	0.95

Appendix I

Split Halves Test of Cluster Stability

	First half			Second half		
Question	High users	Computer users	Low users	High users	Computer users	Low users
a. Overall Internet use	0.373	0.266	-1.804	0.331	0.237	-1.759
b. Daily Internet use	0.180	0.024	-0.790	0.230	0.022	-0.692
c. Filtered	0.145	-0.167	-0.468	0.187	-0.091	-0.451
d. Monitored	0.562	-1.599	0.085	0.562	-1.619	-0.040
e. Own computer	0.289	-0.171	-0.812	0.260	-0.184	-0.873
f. Multiple computers	-0.022	0.236	-0.205	-0.060	0.263	0.010
g. Handheld mobile device	0.143	-0.023	-0.338	0.069	-0.016	-0.304
h. Other device	0.076	0.058	-0.285	0.082	0.011	-0.300

Appendix J

Bivariate Relationship Between Auxiliary Variables and NSSE Benchmarks

Bivariate Relationship Between Auxiliary Variables and Academic Challenge

Auxiliary variable	df (Between Groups)	df (Within Groups)	F	Sig.	Spearman's Rho
Gender	1	888	1.217	0.260	0.047
Race/ethnicity	3	889	0.932	0.425	0.065
First-generation status	1	870	7.7	0.006	-0.092
Internet access and use	2	775	0.352	0.703	-0.018
Institution	7	885	9.958	< .000	-0.028

Bivariate Relationship Between Auxiliary Variables and Active and Collaborative Learning

Auxiliary variable	df (Between Groups)	df (Within Groups)	F	Sig.	Spearman's Rho
Gender	1	888	0.714	0.398	-0.033
Race/ethnicity	3	889	15.531*	< .000	0.185
First-generation status	1	871	3.173	0.075	-0.060
Internet access and use	2	775	0.153	0.858	-0.014
Institution	7	885	10.66	< .000	0.129

Bivariate Relationship Between Auxiliary Variables and Student-Faculty Interaction

Auxiliary variable	df (Between Groups)	df (Within Groups)	F	Sig.	Spearman's Rho
Gender	1	888	0.29	0.590	-0.007
Race/ethnicity	3	889	6.879*	< .000	0.125
First-generation status	1	870	2.074	0.150	-0.043
Internet access and use	2	775	0.421	0.657	-0.013
Institution	7	885	4.442*	< .000	0.069

Bivariate Relationship Between Auxiliary Variables and Enriching Educational Experiences

Auxiliary variable	df (Between Groups)	df (Within Groups)	F	Sig.	Spearman's Rho
Gender	1	888	0.275	0.600	-0.007
Race/ethnicity	3	889	4.915	0.002	0.121
First-generation status	1	870	7.454	0.006	-0.085
Internet access and use	2	775	4.299	0.014	-0.011
Institution	7	885	16.817*	< .000	< .000

Bivariate Relationship Between Auxiliary Variables and Supportive Campus Environment

Auxiliary variable	df (Between Groups)	df (Within Groups)	F	Sig.	Spearman's Rho
Gender	1	887	0.246	0.620	-0.015
Race/ethnicity	3	888	0.755	0.519	-0.035
First-generation status	1	869	2.657	0.103	-0.056
Internet access and use	2	774	0.863	0.422	-0.003
Institution	7	884	1.355	0.221	-0.020

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Education

Indiana University	Ph.D. in Higher Education and Student Affairs Minor in Social Informatics	June 2014
University of West Florida	M.E.d. in Edcuational Leadership Specialization in College Student Personnel	May 2005
University of Tennessee	B.S. in Mathematics Minor in Computer Science	May 2002

Professional Experience

Senior Research Analyst September 2012 – present

Center for Teaching & Assessment of Learning • University of Delaware • Newark, DE

- Collected and analyzed general education and program-specific assessment data to provide meaningful recommendations for improvement
- Provided assessment and evaluation support for grant-funded programs including NSF-funded and Howard Hughes Medical Institute-funded projects
- Consulted with and supported faculty in developing and assessing programs to improve learning

Volunteer Intern May 2010 – September 2012

Center for Innovative Teaching and Learning • Indiana University • Bloomington, Indiana

- Advised and provided consultation for faculty regarding classroom assessment and student learning
- Participated in multiple "Decoding the Disciplines" faculty interviews helping faculty uncover their discipline's epistemology and its application to their teaching
- Conducted Scholarship of Teaching and Learning research, including research methodology consulting and research design for IU's History Learning Project and faculty in the IU School of Informatics and Computing
- Developed, led, and assisted with summer orientation events for new faculty and graduate instructors

Research Project Associate (Graduate Student Assistantship) July 2009 – June 2012

Center for Postsecondary Research • Indiana University • Bloomington, Indiana

- Analyzed data and produced reports related to the National Survey of Student Engagement (NSSE), the Faculty Survey of Student Engagement (FSSE), the Beginning College Survey of Student Engagement (BCSSE), and the Law School Survey of Student Engagement (LSSSE)
- Conducted, presented, and published research into student and faculty use of technology, including forging a new partnership with EDUCAUSE to develop technology questions for the updated 2013 NSSE survey instrument

- Contributed to the NSSE and LSSSE Annual Results reports
- Analyzed psychometric properties of NSSE

Client Services Project Associate (Graduate Student Assistantship) July 2007 – June 2009
Center for Postsecondary Research • Indiana University • Bloomington, Indiana

- Supported and guided institutions participating in NSSE, FSSE, and BCSSE, including administration and promotion of the surveys and interpretation of results
- Coordinated Client Services Webinars, including identification of topics, creation of materials, and scheduling (2008-2009)
- Monitored national media releases and news stories to create local archive of stories, track trends, and alert Center staff of stories and discussions related to Center projects (2007-2008)

Information Technology Fellow January 2006 - June 2007
Technology Integration Services • Sewanee: The Univ. of the South • Sewanee, Tennessee

- Implemented a new online university-wide calendar and event- and resource-scheduling system (Astra Schedule); gathered and analyzed requirements and business practices, configured software and entered data, developed documentation and marketing, and trained users and administrators
- Planned and conducted group training and one-on-one consulting with Sewanee faculty and staff in the development, maintenance, and improvement of university and faculty websites using the Sitemason content management system and other tools and technologies such as RSS and podcasts
- Planned and implemented a "Revitalization Program" to improve and restructure the Residential Computing Consultant (RCC) program, including significant involvement in recruitment, selection, and training of 23-28 RCCs

Member, ResNet Applied Research Group July 2004 – September 2010
Volunteer-run research group affiliated with the ResNet Symposium

- Conducted, presented, and published original research regarding residential computer networks

ResNet Coordinator June 2002 – August 2005
Department of Housing and Residence Life • Univ. of West Florida • Pensacola, Florida

- Supported and educated over 1500 on-campus residents in the proper technical, legal, and ethical use of the computer network in the residence halls and apartments
- Developed and administered technology training for Housing staff and student ResNet Technicians
- Developed, evaluated, and supported computer systems and processes, including webpages, housing management software, financial systems, and reports using SQL and Crystal Reports
- Coordinated departmental assessment efforts

Instructional Experience

Instructor, UNIV 600: Learning Spring 2014

University Studies • University of Delaware • Newark, Delaware

- Taught graduate course focusing on contemporary learning principles and course design using problem-based learning and backward design principles

Instructor, UNIV 601: Pedagogy Fall 2013

University Studies • University of Delaware • Newark, Delaware

- Taught graduate course focusing on contemporary learning principles, active learning techniques, reflection, and the use of the "Decoding the Disciplines" framework to develop lesson plans

Co-Instructor, EDUC C750: Learning and Teaching on the College Campus Spring 2011 & 2012

School of Education • Indiana University • Bloomington, Indiana

- Collaborated with the Lead Instructional Consultant at IU's Center for Innovative Teaching and Learning to update and teach a 3-credit course with 10 graduate students studying learning theory and practice with a specific focus on backward course design, formative assessment, learning bottlenecks, and disciplinary epistemologies

Graduate Student Advisor, EDUC U549: Environmental Theory and Assessment in Higher Education Fall 2009, 2010, & 2011

School of Education • Indiana University • Bloomington, Indiana

- Advised and mentored groups of 3-6 Higher Education and Student Affairs Master's each conducting a semester-long original research project

Instructor, EDUC U212: Virtually Real: Myths and Realities of Online Identities Fall 2008 & Spring 2009

School of Education • Indiana University • Bloomington, Indiana

- Independently developed and taught 2-credit undergraduate course of 20 students to recognize, understand, and describe reasons and motivations, particularly those related to self-identity, useful for understanding behavior common in online environments with a focus on social network services

Co-Instructor, SLS1301: Freshman Year Experience Aug 2004 - Dec 2004

College of Arts and Sciences • University of West Florida • Pensacola, Florida

- Cooperatively developed and instructed one section of the university's Freshman Year Experience class of 25 undergraduate students

Publications and Presentations

Peer-reviewed Publications

Guidry, K. R., & Pasquini, L. A. (2012). Twitter chat as a non-formal learning tool: A case study using #sachat. In H. Yang, & S. Wang (Eds.), *Cases on Formal, Non-Formal, and Informal Online Learning: Opportunities and Practices.* Hershey, PA: IGI Publishing.

Guidry, K. R., & BrckaLorenz, A. (2010). A comparison of student and faculty academic technology use across disciplines. *EDUCAUSE Quarterly, 33*(3). Available at http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/AComparisonofStudentandFaculty/213682

Guidry, K. R., Anderer, C., Futey, D., & Pee, C. (2010). A perspective on residential computer networks: An analysis of ResNet Symposium presentations, 1995-2006. *Journal of College and University Student Housing, 36*(2), 92-108. Available at http://www.nxtbook.com/nxtbooks/acuho/journal_vol36no2/#/94

Chen, P. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of Web-based learning technology on student engagement. *Computers & Education, 54*(4), 1222-1232.

Refereed Papers and Presentations

Guidry, K. R., Cubillos, J., & Pusecker, K. L. (2013, May). Using self-regulated learning to predict student success in a hybrid course. Paper presented at the 2013 AIR Forum, Long Beach, CA.

Guidry, K. R. (2012, May). *Response quality and demographic characteristics of respondents using a mobile device on a Web-based survey*. Paper presented at the AAPOR 2012 Annual Conference, Orlando, FL. Available at http://cpr.iub.edu/uploads/Response%20Quality%20and%20Demographic%20Characteristics%20of%20Respondents.pdf

Middendorf, J., & Guidry, K. R. (2011, October). *Using Decoding the Disciplines to explore patterns in emotional resistance.* Program presented at the 36th Annual POD Conference. Atlanta, GA. Available at https://sites.google.com/site/podnetwork/pod-2011-conference/presentations/using-decoding-the-disciplines-to-explore-patterns-in-emotional-resistance

Guidry, K. R., & Medrano, C. I. (2010. November). *Wikipedia as a lens into public perception of American colleges and universities*. Paper presented at the 2010 ASHE Annual Conference. Indianapolis, IN. Available at http://mistakengoal.com/docs/ASHE_2010_Wikipedia_paper.pdf

Guidry, K. R., & BrckaLorenz, A. (2010. May). *A comparison of student and faculty academic technology use across disciplines*. Paper presented at the Association for Institutional Research 50th Annual Forum, Chicago, IL. Available at http://cpr.iub.edu/uploads/AIR10_TechDisc_paper_FINAL.pdf

Guidry, K. R., Brian, J., Dorsett, Y., & Schulz, B. (2010, March). *Collaborating with technology professionals.* Program presented at the 2010 NASPA Annual Conference. Chicago, IL.

Guidry, K. R., Garver, A., & BrckaLorenz, A. (2010, January). *Using NSSE and FSSE to link technology to student learning and engagement.* Program presented at the ELI 2010 Annual Meeting. Austin, TX. Available at http://www.educause.edu/Resources/UsingNSSEandFSSEtoLinkTechnolo/196011

Chen, P. D., Guidry, K. R., & Lambert, A. D. (2009, April). *Engaging online learners: A quantitative study of postsecondary student engagement in the online learning environment*. Paper presented at the meeting of the American Educational Research Association. San Diego, CA. Available at http://cpr.iub.edu/uploads/Engaging%20Online%20Learners.pdf

Elahe, E. & Guidry, K. R. (2008, March). *New (and old!) technology you can use*. Preconference workshop presented at the 2008 NASPA Conference. Boston, MA.

Guidry, K. R. (2005, June). *Infiltrating the First Year Experience program*. Program presented at ResNet Symposium 2005. Atlanta, GA.

ResNet Applied Research Group (2005, June). *ResNet Survey 2005*. Program presented at ResNet Symposium 2005. Atlanta, GA. Available at http://stream.gatech.edu/departments/gtcn/quicktime/ResNetConference2005/625ResSurv_Bband.mov

Invited Publications and Presentations (* indicates contributing authorship)

Guidry, K. R. (2014, January). *Service learning as a high-impact practice*. Session presented at the Winter 2014 Biannual Meeting of the Summer Service Collaborative. Stanford, CA.

Guidry, K. R. (2013, July). *Disciplinary differences in student use of social networking technologies*. Alumni presentation at the Oxford Internet Institute Summer Doctoral Programme. Toronto, ON.

Guidry, K. R. (2011, March). *Creative collaboration through technology.* Professional development program presented for the division of Student Life and Leadership at Xavier University. Cincinnati, OH.

Guidry, K. R. (2010, November). *Connecting and networking in the 21st century*. Keynote speech presented at the annual meeting of the Wisconsin Association of Student Financial Aid Administrators. Appleton, WI.

Guidry, K. R. (2010, November). *Reaching out to students with technology*. Program presented at the annual meeting of the Wisconsin Association of Student Financial Aid Administrators. Appleton, WI.

Guidry, K. R. (2010, June). *Assessment*. Preconference Development Seminar presented at ResNet Symposium 2010. Bellingham, WA.

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Guidry, K. R. (2007, Fall). Challenges and opportunities posed by online video. *Leadership Exchange*.

Guidry, K. R. (2007, June). *The impact of social networking on ResNet users*. Preconference Development Seminar presented at ResNet Symposium 2007. San Diego, CA.

Guidry, K. R., Strahm, E. & Tritsch, G. (2006, August 17). *Residence hall communications trends and issues* [ACUTA web seminar].

Futey, D. & Guidry, K. R. (2005, October). *The 2005 ResNet Survey: Key findings* [EDUCAUSE Live! Presentation]. Available at http://educause.edu/LIVE0519

The University of West Florida (2004). Computer skills: E-learning, ethics, and responsibilities. In *The University of West Florida EXPERIENCE: Your Guide to Success*, SLS1301: Freshman Year Experience Textbook. Pensacola, FL: Author.

Other Publications and Presentations (* indicates contributing authorship)

Law School Survey of Student Engagement. (2012). *Navigating law school: Paths in legal education*. Bloomington, IN: Center for Postsecondary Research.*

National Survey of Student Engagement. (2011). *NSSE annual results 2011: Fostering student engagement campuswide.* Bloomington, IN: Indiana University Center for Postsecondary Research.*

Arroway, P., BrckaLorenz, A., & Guidry, K. R. (2011, October). *National Survey of Student Engagement Technology Initiatives Community Update.* Program presented at the 2011 EDUCAUSE Annual Conference. Philadelphia, PA. Available at http://www.educause.edu/E2011/Program/UPD15

Indiana University Office of Research Ethics, Education and Policy. (2011). *Fall 2011 Responsible Conduct of Research Workshop - Collaborative Research* [Panel discussion]. Bloomington, IN.

Guidry, K. R. (2011, September). *Student affairs and technology*. Brownbag lunch discussion hosted by the Indiana University Student Personnel Association. Bloomington, IN.

Guidry, K. R., Cabellon, E., Dare, L., Elling, T., Sabado, J., & Sendhill, G. (2011). Judges' reflections on the StudentAffairs.com 2011 Virtual Case Study. *The Journal of Technology in Student Affairs*, Spring 2011. Available at http://studentaffairs.com/ejournal/Spring_2011/judgesreport.html

National Survey of Student Engagement (2010). *Psychometric portfolio.* Bloomington, IN: Indiana University Center for Postsecondary Research.*

Law School Survey of Student Engagement. (2009). *Student Engagement in Law School: Enhancing Student Learning*. Bloomington, IN: Center for Postsecondary Research.*

National Survey of Student Engagement (2009). *NSSE annual results 2009: Assessment for improvement: Tracking student engagement over time.* Bloomington, IN: Indiana University Center for Postsecondary Research.*

Guidry, K. R. (2009). The digital divide and the participation gap: Challenges to innovation. *Student Affairs Online, 10*(2). Available at http://studentaffairs.com/ejournal/Summer_2009/DigitalDivide.html

Guidry, K. R. (2008). Sources for understanding undergraduate student's use of technology. *Student Affairs Online, 9*(3). Available at http://studentaffairs.com/ejournal/Winter_2008/UndergraduateStudentUseofTechnology.html.

Guidry, K. R. (2008, October). *Web 2.0: Social software foundations and implications*. Preconference workshop presented at the 2008 SIGUCCS Conference. Portland, OR.

Guidry, K. R. (2008). Exploding a myth: Student affairs' historical relationship with technology. *Student Affairs Online, 9*(2). Available at http://studentaffairs.com/ejournal/Summer_2008/ExplodingaMyth.html.

Guidry, K. R. (2008, Spring). The great divide in social networking sites. *Leadership Exchange.*

Guidry, K. R. (2006, September 27). Online communication is healthy, normal, and critical to identity development. *NASPA NetResults*.

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Guidry, K. R. (2003). We built and they came: Challenges presented by performing research on the Internet. *Talking Stick, 21*(3), 19-20.

Professional Service

Committee Memberships

Member, University of Delaware Student Success and Retention Working Group, 2013

Chair, Indiana University (IU) Graduate and Professional Student Organization (GPSO) Awards Committee, 2010-2013

Member, IU GPSO Travel Grant Committee, 2008-2010

Member, IU School of Education Research and Development Committee, 2009

Member, IU Higher Education and Student Affairs 2009 Outreach Committee, 2008-2009

Member, Sewanee ITS New Faculty Orientation Committee, 2006

Member, Fall 2006 Sewanee Library Student Employment Working Group, 2006

Member (Student Affairs representative), University of West Florida (UWF) Open Source Software Committee, 2005

Member, UWF College Student Personnel Program Marketing Work Groups, Fall 2002 & Spring 2005

Chair, UWF Campus Life Assessment Committee, 2004

Review Groups and Judging Committees

Program reviewer, Hawaiian International Conference on System Sciences, 2013
Program reviewer, POD Network Conference, 2012 & 2013
Reviewer, *To Improve The Academy*, 2013
Reviewer, *Journal of College Student Development* Research In Brief and On The Campus sections, 2008-2013
Judge, StudentAffairs.com Virtual Case Study, 2011
Judge, Indiana University Undergraduate Research Conference, 2009
Award reviewer, NASPA Excellence Awards (Administration, Assessment, Information Technology, Fundraising, Professional Development, and related), 2009 & 2010
Program reviewer, ACPA Annual Conference, 2006-2007, 2011
Program reviewer, NASPA Annual Conference, 2006-2011

Professional Affiliations

American College Personnel Administrators (ACPA), 2005-present
American Educational Research Association (AERA), 2008-present
Association of Internet Researchers (AoIR), 2007-present
National Association of Student Personnel Administrators (NASPA), 2005-2011
National Co-Chair, Technology Knowledge Community, 2007-2009
Region IV-E Technology Knowledge Community Representative, 2009-2010
Professional and Organizational Development Network in Higher Education (POD), 2011-present

Honors and awards

Participant, 2011 Oxford Internet Institute Summer Doctoral Programme
Nominee, 2011 City of Bloomington *Be More Award* volunteer award
Participant, 2010 AERA Division J Emerging Scholars Workshop
Participant, 2010 NASPA Doctoral Student Seminar
Recipient, 2009-2010 Indiana University School of Education August and Elizabeth Eberle Fellowship